OBSERVATIONS

OF THE

SPOTS ON THE SUN

FROM NOVEMBER 9, 1853, TO MARCH 24, 1861,

MADE AT REDHILL,

BY

RICHARD CHRISTOPHER CARRINGTON, F.R.S.

ILLUSTRATED BY 166 PLATES.

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SECTION I.

INTRODUCTION.

OBSERVATIONS OF THE SOLAR SPOTS DURING SEVEN YEARS AND A HALF, MADE AT REDHILL, FROM 1853 TO 1861, BY R. C. CARRINGTON, ESQ.

THE observations herein contained are less extensive than was originally intended, still it may be worth while to give a short account of what was designed to be done, and how the design has been modified by circumstances. The observatory which I built at Redhill in the summer and autumn of 1852 was specially arranged and fitted for meridian observations of Circumpolar Stars, as stated in the Preface to my Catalogue of Stars published in 1857. While superintending the progress of the buildings and kept for a time from access to instruments, I was led into a study of some series of drawings of the Sun's disk in the possession of the Royal Astronomical Society, and following on the subject, as one of great physical interest and of increasing importance, was much impressed with the capricious manner in which observations of the solar phenomena had commonly been taken up and laid aside again, the entire neglect of the subject by the public establishments, grave defects in the methods of observation commonly employed, and as might be expected, large discrepancies in the results of previous observers in respect of the Elements of Position of the Pole and Period of Rotation. At the same time it will be remembered, on comparison of dates, that the publication of the Cosmos of Baron v. Humboldt had reached that part in which he collects into one view the state of our knowledge of "The Sun considered as the Central Body," and in which, for the first time, due prominence was accorded by one of those minds to which the world defers to the results of observation of the Hofrath Schwabe of Dessau. It was at the same time, or nearly thereabouts, that with some trouble I procured a copy of Professor Rudolph Wolf's "Neue Untersuchungen über die Periode der Sonnenflecken und ihre Bedeutung," in which, (though priority is due to General Sabine,) the parallel is pointed out between the recent periodic variation of Solar spot frequency, and a certain periodicity in terrestrial magnetism, and a first endeavour made to retrace the maxima and minima of past periods. That the Solar phenomena, amid the universal subjection to order and law, should alone be subject to caprice could never gravely be entertained by any mind of philosophic training, but till the time of the appearance of the works above referred to, the attempts of several able men had tended to increase a very general conviction that time and labour would be thrown away on such a subject, and that beyond the limitation of the appearances to certain zones on the Sun, there was nothing to indicate law or the

scale of time on which changes (if any) in the phenomena took place, or that the efforts of a lifetime might not be practically wasted—and have as their sole result an astronomical picture-book. Hofrath Schwabe's labours had, however, given a great turn to this feeling, and the time had plainly arrived for the Public Observatories or some of them to take up the subject; yet, calculating on the slowness with which action in these matters commonly follows conviction, I thought I could very well appropriate the Solar Spots to myself at Redhill for the next eleven years' period, estimated to commence in 1855 and end in 1866, and that a close and methodical record of the phenomena in their development as a whole as well as individually, from shortly before the commencement of the increase of frequency, till a sufficient time after its next decrease, would probably be attended with considerable success, and at least ensure for the subject in future the attention of the Public Observatories. I therefore decided on making the study of the Solar Spots my second subject, there being the personal advantage that while the observations of stars for my intended Catalogue required the hours of the night and afforded little matter for speculation, the observation of the Sun was of course a day-task, and presented more variety and interest. In coming to this arrangement it is proper to observe that I did not propose to myself "Solar Physics" in their entirety. The distribution of radiative power, the position of the thermal equator, the numerical amount of illuminating power and its possible variations, the estimation even of the degree of energy exhibited in the production of spots, and many other features were consciously left aside, and the subject before my mind reduced pretty much to tracing regularity in the distribution of the maculæ, detecting the true period of Rotation of the Body of the Sun, and the determination of the systematic movements or currents of the surface, if such existed in any definable manner. To carry out this plan it was in the first place necessary to devise a new and more commodious method of observation than any hitherto adopted, and to lay altogether new foundations of method in recording, reducing, comparing, and discussing, for I unhesitatingly say that no observer would for any length of time have followed out any of the modes of observation previously practised. If he had dotted down the spots on sheets of paper on which he had projected an image of the Sun, he would speedily have abandoned his subject in disgust with the inaccuracy of the resulting positions for any precise object of research (that is, if he took the pains to discuss them, which was rarely done), and if he had applied the micrometer, he would speedily have found that half his opportunities of obtaining records would be lost while making his necessary preliminary adjustments, and that he could very rarely instead of always obtain a complete record of a single disk. One other process was indeed becoming applicable, namely, that of photographic registration as recommended by Sir John Herschel in his letter of April 1854, which has since led to the preparation of the Kew Photoheliograph, but I did not see my way to its adoption as a ready-made working method at the time, and was not disposed to lose time in experiments in which I should be interfering with the ideas and speculations of others.

Perhaps, I may add, that here also I calculated on the probable slowness with which this method would be brought actually into application, feeling the great advantage which I then possessed as an unfettered man to follow out my own devices, and that with my free telescope, I should probably have time to store up a respectable harvest before the new reaping machine was brought to perfection. My scheme was perhaps too large for a private person to entertain, for it has been interrupted half way by the affairs of life, and I have to console myself for the disappointment of a partially spoiled design by the hope that the method I have planned and the results I have obtained by it may shortly lead to the establishment of more than one public observatory, in which by mutual co-operation, similarity and diversity of treatment, this special department of Astronomy may at length be treated as its importance demands. It has not been without the successive employment of several assistants that I have been able to accumulate and present the results of the observations herein contained. During 1854, 1855, 1856, and 1857, I took all the observations myself, but was aided in their reduction by my assistant Mr. Simmonds. During 1858, I had no assistant, and my arrangements were greatly disturbed by the sudden death of my father, the superintendence and ultimate taking up of whose affairs caused much absence from Redhill. In 1859, I had the assistance for two short intervals, of Mr. J. Breen and Mr. H. Criswick, and towards the close of the year engaged Dr. von Bose, who shortly made himself familiar with my methods of observation and reduction, and applied them with much success through the year 1860, when the spots were very numerous and complicated. On his departure, I engaged Dr. Schroeder then in Paris on leave of absence by the department of public education of Hanover, and who observed with tolerable success for about three months. On his departure in March 1861, which occurred sooner than expected, in consequence of his being recalled to become Director of a provincial school, I decided to close the series and wind up the results I had obtained; the necessity of my being personally engaged in commerce still continuing, and the prospect of my being able to give an observer's attention to the subject having become very remote, in consequence of a decision respecting a certain appointment to which I shall not more particularly allude. I have had much assistance in preparing the drawings and completing the numerical reductions from the same Messrs. Simmonds and von Bose, the latter of whom has since become my assistant again in another capacity.

I have in a former paragraph spoken of grave defects in the methods of observation. It will not be without future utility if I name a few by way of public execution, for scientific as well as social progress is sometimes promoted by putting the laws in force. Such are in my opinion the following:

1. Records consisting of drawings unaccompanied by determinations of positions or even of scale.
2. Measures of positions of nuclei belonging to groups of which no drawings are given. A defect much more pardonable as arising from the great demands and cost of

illustrations, but which is destructive of their value when used as data for founding elements upon.

3. Partiality in observations. The selection of large or special objects from motives of fancy and not fair samples of the whole disk.
4. Observations of differences from one limb only, requiring the assumption of the diameter, a method which the experienced will unite in condemning as needlessly faulty, while the inexperienced will protest he sees no objection to it.
5. Measurements so made (I instance Pastorf's, though with all respect for himself) that their reduction for any purpose whatever would be attended with vastly more trouble and less profit than commencing anew.
6. The attempt to determine the direction of the meridian crossing the disk by running the image with telescope fixed after setting down the positions either on a previously drawn circle or obtaining a photograph. I fear the noxious influence of this notion more than any other, for while other faults are readily seen and put aside this has a semblance of accuracy and may still come to destroy the value of many a future record. It is not so easy to procure a "conviction" in this case, for condemnation will only be agreed on by those who have gone through much labour of reduction with disappointment in the result. I have known several persons who have accumulated observations untested by reduction continue to practise this process, when a few hours spent in discussing their record would convince them of the necessity of changing their method of observation.

I pass over many more obvious defects depriving records of all scientific value, such as drawings by mere estimation on a scale of less than two inches to the diameter, although they are frequently forced upon our notice.

In the next place I will briefly refer to the discrepancies I have alluded to in the same paragraph. I found matters were little mended since 1776, in which M. Lalande in his first memoir gave a table of "Authors who have determined the position of the Solar Equator" and their results. These results, though many are respectable, might be considered as superseded by the more modern determinations of Laugier, Böhm, Petersen, Kysæus, Bianchi, and others; but still the results stood thus:

Date.	Observer.	No. of Series.	Rot.	I.	N.	For.
1842	Laugier	29	$25^{d}.34$	$7^{\circ}.\ 9'$	$75^{\circ}.\ 8'$	1840
1852	Böhm	13	25. 52	6. 57	76. 47	1833
1841	Petersen	1		6. 51	73. 29	1841
	„	5	Diff. values			
1846	Kysæus	3	25. 09	6. 38	76. 38	1841

I may perhaps pass over some other determinations, but the above are sufficient to show the state of the subject. It is desirable in passing them in review that notice be taken of the very undue prominence of supposed value given to the Elements of Petersen (which are quoted from Astron. Nachrichten, No. 418, Vol. 18, p. 158) and which are

based on the eight observations of one spot denoted in his paper by the letter *b*. It is only to be explained by the circumstance that in this case the details and theory were simultaneously published, and that the observations and treatment were conducted by one in whose ability confidence was placed. If the spots were absolutely fixed points on the Sun, the single series discussed as it was would have given an undoubtedly good result for a single series, but it implied a total forgetfulness of their variability of form and motion for this result to have been so often in after years quoted with evidently high importance attached to it. The result of Kysäus is quoted from his Essay, "Ueber die Axendrehung der Sonne von Rudolf Kysäus, Siegen, 1846," in which numerous but not convenient formulæ will be found, and in which three of Petersen's observations (including his spot *b*) are taken for data. The result is therefore of more weight than Petersen's own, although it happens to be in each element further from the truth. Dr. Böhm's Memoir is elaborate and the details of his observations and processes are given. I find no particular fault with it, but at the same time I attach no particular weight to the results. M. Laugier's unpublished Memoir, so far as I could judge from the report on it by the referees given in the Comptes Rendus of 1842, was of much higher value, and I still hold it to be a matter of much regret that he should have delayed the publication in the hope of improving his results, till the probability has become very small after the lapse of twenty years that the public will ever be further benefited by it. To M. Laugier's results I attached by far my principal confidence on account of the number of series on which they are based and the known skill of the Astronomer. I did not adopt his results absolutely as my provisional elements, but although I forget at this time the exact reasons by which I was led to use slightly different elements, it is now curious to see that I even then guessed rightly the directions in which they required correction, for I was led to slightly increase his value of the Inclination and diminish his longitude of the Node. While the position of the Solar Equator was thus still affected with an unknown amount of error, the very ideas respecting the Period of Rotation were at fault. I shall here give in illustration a passage from the letter of Bianchi to Schumacher, of May 27, 1843. (See Astron. Nachr. 483):

"If I may be allowed, I will, before closing my letter, put in a little claim I have to priority on a third subject. A short time since I read in the journals the Notice of the Report made to the Academy of Sciences of Paris, by M. Arago, on a work of M. Laugier, the object of which is to fix with certainty the period of Solar Rotation by means of observations of the Spots. The learned Secretary and Reporter concluded, and I think very justly, that the calculations and results of M. Laugier were the best hitherto obtained in this branch of research. And without doubt it must be interesting to see how, in the original memoir of this young Astronomer, he has ascertained and established the existence of proper motions among the spots he observed. Nevertheless, I have to remark that in the year 1817 I observed at Milan a Solar Spot of long duration, from which, by the means of a number of values which presented a good mutual accordance,

I obtained, as the time of the sidereal or *absolute* rotation of the Sun 25·325 days, a result which differs very slightly from that of Laugier. My paper, containing the determination and considerations naturally connected therewith, appeared in the published correspondence of the Baron de Zach (see Vol. V. pages 409—427, and pages 521—539). In my calculations I assumed that the spot had no movement of its own, which was indicated very simply by the invariable size and figure which this spot presented during three or four successive appearances. Now, if M. Laugier and I thus agree in the amount of the Rotation we must conclude that the Solar Spots are of two kinds, those which notably change their place on the Sun's surface* and those which remain constantly at the same place."

It will be remarked that in this passage from the writings of an experienced Astronomer, there was still not the smallest suspicion that the differences of period observed were systematic, or that they depended in any way on the latitude of the particular spots, or that the times of Rotation of the general body of the Sun and of its fluid surface were different, for he speaks of the absolute Rotation of the Sun as determined from suitable observations of a single spot as a possibility, and this is after the researches of Laugier on the subject. It will be seen that Petersen, in the Memoir I have referred to, contents himself with showing that his five spots give discordant values, and Kysäus, repeating his reductions, simply remarks that the mean of three spots gives one value with a certain probable error, and the mean of two of them a certain other value. Dr. Böhm, and in short all others, leave the subject in the same state. Views of increasing clearness are however expressed in an admirable little paper by Dr. C. H. F. Peters, now of Clinton, New York, published in an early Volume of the Transactions of the American Association for the Advancement of Science, entitled "Contributions to the Atmospherology of the Sun," in which he draws his materials from observations of some extent made by himself at Naples in 1845, but which have remained unpublished, probably from the difficulty of procuring admission into any Transactions of the necessary number of illustrations. I quote a few sentences from this paper, remarking that I did not receive it from the author till my own researches had made considerable progress.

"The first fact, now, which offers itself, in comparing the heliographic places of one and the same spot for different days, is that the spots are not invariably attached to the Sun's surface but have *proper motion*." . . . . "Whenever in nature a motion is observed, inducement is given to research of laws and of forces causing it." . . . . "A general proper motion of the spots towards the Equator (so he infers) being recognized, the question is raised naturally: Have they any motion also in longitude? and in what sense (direction) to the East or to the West? The solution of this question is intimately connected with the determination of the time of rotation. For, it is clear, if all the spots had an *equal* proper motion in longitude, the time of the Sun's rotation, since it is deduced

* This remark reads strangely now, but it is a first doubt of Lalande's mountain peaks being a sufficient theory.

from the spots would be wrong." . . . . "In other words, it is the time of rotation of the spots which results and not that of the Sun itself." . . . . "By means of this average value of the time of rotation, now, the successive places leave differences so significant that there can be no doubt of a very considerable motion parallel to the equator. The displacements in longitude seem even far more considerable than those in latitude. The annexed table B gives some examples. Whether there be a common motion, and in what sense (direction) cannot be decided in the present state of our knowledge of the Sun's rotation." . . . .

So nearly did this able observer come to the term in latitude without obtaining it, and leave its actual determination to me. I have great pleasure in referring to his very excellent remarks, and particularly in referring the reader to his description of the normal history of the process of development and reabsorption of a spot, in which his indications are much in advance of anything else which has appeared on the subject. I do not intend in this place to write fully on the previous labours of others, especially when the treatment of the subject has been directed by different objects in view, but Dr. Wilson of Glasgow, and Sir W. Herschel, are two observers whose conclusions are necessarily involved directly or indirectly in every research subsequent to their own. I allude to Dr. Wilson's Memoir in order to remark that, although I hold his general conclusion that the Solar maculæ are cavernous, or hollows in the general level of the luminous surface, his specific description and diagram conveys an impression which is somewhat erroneous. Principally, that as a general description it is too precise; there is more variety in the appearances than he confesses to, and there are marked departures from his description of form, which is rather one specific type out of several which might be adduced, and will be familiar to every one when photography has furnished us with forms on which all, whether observers or not, may rely. Sir W. Herschel's theory of the section of a spot, or rather Sir John's modification and improvement upon it, requires, in my opinion, reconsideration, particularly since the discovery by Mr. Dawes of what I may momentarily term the doubly black nucleus. The necessity of this reconsideration will be felt on the one hand when due attention is bestowed on its capability of application throughout their duration to the more complicated, as well as to normal simple spots; and on the other hand, when the motion in longitude depending on the latitude as now established is considered, at the same time that the constant relation of nucleus and penumbra is remembered. I do not pretend to have finally formed opinions on the theory of the spot-section, and I find it certainly more easy to frame objections in this matter than to remove them; but I think a certain degree of attention is desirable to the views of Professor Sestini, as published in the Washington Observations. I will add that Schwabe's remark must in any case be borne in mind—that the depth of the cavity in some instances is much less than in others, and is certainly variable. Laugier has remarked (in a private letter to me) that the so regarded black ground of the nucleus frequently appeared to him under high powers, when the atmosphere admitted of their application, as an assemblage of dark points with little interstices, and there was general

evidence to his mind of a sort of porosity, he even says resolvability, using the term as applied to the nebulæ. As I have not regarded these points of physical interest within the scope of my researches, I leave them at this point to succeeding observers as matters for consideration. It suffices for my present purpose that a simple spot is a cavity of which the nucleus may be regarded as the shallow bottom, offering a tolerable definite centre as a point of observation.

I pass on to the conditions I proposed to comply with in the method to be adopted :—

1. On any day of observation every spot visible and observable with the telescope was to be observed and drawn, without preference to small or great.
2. The observations of position to admit of great rapidity, in order to be a match to the unfavourable climate in which they were to be made, and therefore the necessity of any adjustment of the telescope to be evaded.
3. The system to be such as admitted of brief and orderly record, in a form obviously intelligible at any future time, and admitting of a uniform and invariable process of reduction with as few figures as possible.
4. The system of observation at the same time to be of a high degree of accuracy, without which the great labour necessarily involved would not be adequately compensated.
5. The method to be as far as possible applicable with any ordinary telescope without special appliances, in order to be available by others.

I may not state the whole, for considerations of this kind are of the nature of prophecy after the event, and do not occur at the time in so orderly a form. One method is thought of and tried, and found to have objections of one sort, and then another, and another, till the observer finds he is satisfied, and cannot further improve on himself. The method I have pursued did not occur at once in its final form, but grew out of a somewhat rude notion of making the disk of the sun its own circular micrometer, and the process of reduction was successively improved, and more than one volume commenced and put in the fire, as means of shortening and simplifying the process came into view by practice and trial. Firstly, I decided on observing the disk by projecting it on a screen placed at some distance from the eye-piece of the telescope. The telescope used was my Equatorial by Simms, of 4·5 inches aperture, and 52 inches focal length, possessing a large and flat field, from having been constructed for a comet seeker, and armed with a positive eye-piece of power 25. There is nothing new so far, the very arrangement being to be seen in the earliest work of the Sun, that by Scheiner, "Rosa Ursina" (p. 349), in which the idea is attributed to Gruenberger, and is again found to be employed by Hevelius, and delineated by him in his Selenography. In the focus of the telescope, however, I placed two bars of flattened gold wire, at right angles to each other (very nearly), and turned *approximately* into the position of being inclined 45 degrees on each side of a meridian, or parallel of declination. The independence of

the result of the bars being exactly placed, is the feature of principal importance, as doing away with the necessity of preliminary adjustment, and the telescope being by this means always ready for use, without the loss of a moment. The image of the Solar disk, and the cross bars in focus, was projected on a screen provided with a support to hold it in any desired position, and brought out with distinctness by placing around the object-glass a large collar, to throw the whole apparatus into shade. The screen was of glass roughened and then coated with straw-coloured distemper (or colour mixed without oil), having a dull surface, trial of various tints leading to the adoption of a pale yellow, and glass not being liable to curl or buckle by the action of heat or moisture. The image was first made to be from 12 to 14 inches diameter, but it being intended to record the appearances to a scale of 12 inches in the volume of reproduced disks, and it being found that in drawing and recopying the tendency was always to draw too large, the image was shortly reduced to 11 inches, to allow for unintentional exaggeration. The telescope was held firmly in declination by a rod connecting the eye end and the lower end of the polar axis. In Right ascension an ordinary good clamp maintained it in position, and generally immovably, but if wind caused any vibration it was sensibly felt in Right ascension only. The image was of course seen to run along the screen from right to left, the true north limb being the upper limb on the screen, and contacts were in all cases observed at the eastern edge of each bar only. In Fig. 1 is shown the general arrangement; in Fig. 2 the relative positions as projected on the screen; in Fig. 3 the disk of the Sun in its natural position. It is not to be inferred from the equality of the circles in Figs. 2 and 3, that the field of view was equal or nearly equal to the Sun's disk: its diameter was about four times that of the Sun.

The observation consisted firstly of drawing every visible spot or group to the intended scale, and indicating the particular nuclei or points of the nuclei selected for observation. To these, letters of the alphabet were assigned as names for the day, and then the order in which they arrived at each bar written down, before proceeding to note the time. The disk was next adjusted by moving the telescope and finally clamping it in declination, so that the centre should pass a little above or a little below C, the intersection of the bars; the position of some spot or group nearly on the parallel of the centre commonly being the motive of the selection of position; there being no theoretical condition to comply with beyond that the centre of the disk should be within a moderate distance from C. The disk was then screwed back by turning the R. A. handle of the instrument to such a position that it would take 10 or 15 seconds before the first contact of either limb with a bar would take place, and then the handle was gently released and a second taken from the Chronometer, while the minute vibration of the telescope in R. A. was ceasing of itself. The times of contact with each bar were then observed and recorded for the Sun's advancing limb, each nucleus selected as before named, and Sun's retreating limb. When the number of spots did not exceed 5 or 6, the contacts of both bars could commonly be observed with ease simultaneously, and in these cases three sets of passages were taken.

But when any difficulty occurred from the number or awkward position of the spots, the contacts of the two bars were observed separately and alternately in either of the following orders, three of one, and two of the other:

A, B, A, B, A, or B, A, B, A, B.

When both bars could be observed at the same time, the observation would take about 4 minutes a bar, or 12 minutes, besides the drawing, preparation and putting away; when separately about 20 minutes, as there was a trifling convenience in commencing a set at about 10 seconds after every fourth minute for the comparison of the numbers afterwards and detection of error. It is a feature of this arrangement of considerable value in point of accuracy, that the chromatic separation of the image of any point under observation, whether the limb or a spot, is of necessity in the direction of the bar, the bars being nearly radial from the centre of the field of the telescope, and consequently that the contacts, which take place at right angles to each bar respectively, are wholly unaffected by such separation. Let A_1 A_2 and B_1 B_2 be the images on the screen (see Fig. 2.) of the two bars placed as described, S A B the path of any point within the Sun's disk, the N. Polar Dist. of the centre being $= \delta$. Let N C be a line drawn through C in the direction perpendicular to S A B towards the North, from which, if the Sun's N. P. D. is increasing, it will differ slightly towards the West, and if decreasing slightly towards the East by a quantity (ι), which can afterwards be considered as a correction. Let A and B be the acute angles S A A_1, S B B_1, of intersection of S A B with the respective bars, then,

$$N\,C\,A_2 = 90 - A$$
$$N\,C\,B_1 = 90 - B = A + \theta$$

if the North Angle of intersection of the bars, or A_2 C B_1 exceed a right angle by θ. Next let F be the factor by which any interval of time shown by the chronometer requires to be multiplied, to convert it into sidereal time; then if the point observed moves from s_1 at time t_1 to s_2 at time t_2 (see Fig. 2)

$$s_1\,s_2 = 15 \sin \delta.\ F\,(t_2 - t_1)$$

and the motions perpendicular to the bars A_1 A_2 and B_1 B_2 are respectively,

$$s_1\,a = s_1\,s_2 \sin A, \quad s_1\,b = s_1\,s_2 \cos (A + \theta)$$

Pass next to Fig. 3, in which lines are drawn through the centre of the disk parallel to the bars, and in which S is the supposed position of a spot, and suppose the times of contact to be designated as follows:—

A_1 . . . first contact of Sun's limb, at A_1 A_2

A_2 . . . last ,, ,,

$A = \frac{1}{2}(A_1 + A_2)$, time of passage of centre.

a . . . the time of contact of any spot.

B_1 B_2 B and b representing the like for bar B_1 B_2; then by what precedes

$$\text{Diam.} = 15 \sin \delta.\ F.\ (A_2 - A_1) \sin A$$
$$= 15 \sin \delta.\ F.\ (B_2 - B_1) \cos (A + \theta)$$
$$S\,a = 15 \sin \delta.\ F.\ (a - A) \sin A$$
$$S\,b = 15 \sin \delta.\ F.\ (b - B) \cos (A + \theta)$$

Further let,

$$S\,C\,b = \alpha$$

$$S\ C = r. \qquad \text{and Rad.} = R$$

$$\frac{B_2 - B_1}{A_2 - A_1} = \tan A', \qquad \text{and } \frac{b - B}{a - A} \cdot \frac{A_2 - A_1}{B_2 - B_1} = \tan \alpha'$$

then will

$$\tan A' = \frac{\sin A}{\cos (A + \theta)}$$
$$\tan (A' - A) = \sin^2 A'.\ \tan \theta$$

and θ being supposed small

$$A = A' - \theta\ .\ \sin^2 A'$$

Similarly we shall find on reduction

$$\alpha = \alpha' - \theta.\ \sin^2 \alpha'$$

Whence the angle of position of the spot

$$N\,C\,S = (A + \theta) + \alpha + \iota$$
$$= A' + \alpha' + \iota + \theta.\ (1 - \sin^2 A' - \sin^2 \alpha')$$

Also since

$$S\,a = 2.\ R.\ \frac{a - A}{A_2 - A_1} = r. \cos (\alpha + \theta)$$

and

$$S\,b = 2.\ R.\ \frac{b - B}{B_2 - B_1} = r \sin \alpha$$

we find for the distance from centre expressed as a decimal of R,

$$\frac{r}{R} = 2. \frac{a - A}{A_2 - A_1}\ .\ \sec (\alpha + \theta), \qquad \text{or } 2.\ \frac{b - B}{B_2 - B_1}\ .\ \operatorname{cosec} \alpha$$

If d be the Sun's hourly increment of declination as given in the Naut. Alm. in seconds of arc, the correction

$$\iota = \frac{d}{15.\ \sin \delta \times 60 \times 60 \times \sin 1''}$$

The value of which varies (see Tables,) from + 3′·8 at about the Vernal Equinox, to — 3′·8 at the Autumnal.

Throughout the reductions of my observations, the correction for error of verticality, θ, has been neglected, and consequently the position-angles of all spots made too small by the amount $\theta.\ (\frac{1}{2} - \sin^2 \alpha')$ since A' or A was always kept nearly equal to 45 degrees. The angles exceeding 45 degrees were always the N and S, reversion of the telescope not affecting this relation, and the value of θ by trials of diameter results made on three or four

occasions found to lie between 2 and 5 minutes of arc. The general effect of the omission will be to cause the deduced heliographical latitudes of all spots to come out too great by a small quantity which can never exceed $\frac{1}{2}\theta$, and which becomes zero at the middle of the spot's passage across the disk. The omission in any case can, therefore, have had no sensible effect.

With the calculated distances and position-angles of the points observed, and the drawings of detail of each group, the disk as observed was reproduced, and laid down for each day in a series of volumes on a scale of 12 inches to the diameter in all cases; and in any observatory which may be partially devoted to this subject, it will be desirable that a similar pictorial record on a not less scale, should be reproduced and preserved. No mere disks are included in the present plan among the illustrations, as their number forbids the contemplation of their being published. An equivalent record in a more digested and easily comparable arrangement is given instead, which will find its explanation further on.

I pass to the second stage of treatment, by which from relative positions on the disk are deduced the heliographical elements of each spot.

Let (R) be the sun's semidiameter in minutes of arc, and let $\rho' = \frac{r}{R} \cdot (R)$ . . (see Fig. 4) then will ρ, the angular distance at the Sun's centre of S from C, the apparent centre of the surface, or direction of the earth, be given by the relation

$$\frac{r}{R} = \sin(\rho + \rho'), \qquad \text{or } \rho = \sin^{-1}\frac{r}{R} - \rho'$$

since in the figure

$$\frac{O\,\sigma}{O\,\Sigma} = \frac{O\,\sigma}{O\,S} = \sin O\,S\,\sigma = \sin(S\,O\,E + S\,E\,O)$$

In Figure 5 let P be the position of the Sun's N. Pole, C N (as before) the meridian through the apparent centre, S the spot, N D M the Solar Equator, N the ascending Node, and

N D M = L, the heliographical longitude of C, or of the Earth at the time.

C M = D, the heliographical latitude of C.

N C P = G + H, the angle G being the inclination of two planes passing through the line joining the centres of the Sun and Earth, and the poles of the Earth and Ecliptic respectively, and the angle H the inclination of two planes passing through the same line, and the poles of the Sun and the Ecliptic respectively.

Also let l = N D the heliographical longitude of S reckoned along the Solar Equator from N.

λ = D S the Spot's heliographical latitude.

then in the triangle P S C are known

$$P\,C\,S = (A + a + \iota) + (G + H) = \chi \text{ suppose}$$
$$S\,C = \rho, \qquad \text{and} \qquad P\,C = 90 - D$$

therefore readily

$$\sin\lambda = \cos\rho \,.\, \sin D + \sin\rho \,.\, \cos D \,.\, \cos\chi$$
$$\sin(L - l) = \sin\chi \,.\, \sin\rho \,.\, \operatorname{cosec}\lambda.$$

which determine l and λ.

The auxiliary angles are readily deduced from Figure 6, in which N C is part of the ecliptic, N M the Solar Equator, N the ascending Node, C the direction of the Earth, K the pole of the Ecliptic, P the Pole of the Sun. The known angles and sides are

$$MNC = I\ ,\ NC = 180^\circ + \odot - N,\ NMC = 90^\circ$$

whence

$$\tan L = \cos I.\ \tan(\odot - N)$$
$$\sin D = \sin I.\ (\odot - N)$$
$$\tan H = \tan I.\ \cos(\odot - N)$$

similarly $\tan G = \tan \omega.\ \cos \odot$

Tables of these quantities for every degree of the arguments were computed with the provisional elements I=7°. 10′ and N=74°. 30′ for 1854·0, copies of which are appended to the Preface; from which the required values for each observation were found almost by interpolation at sight.

I proceed to give a complete example of an observation and the process of reduction.

On page 188 of my third manuscript volume of observations is found the following entry,

1860, August 9th, Thursday. page 188.

Observed by Mr. von Bose.

$10^{h}.\ 16^{m}{\cdot}0$ Chron. = $10^{h}.\ 39^{m}.\ 57^{s}{\cdot}5$ Appleton (Clock). Bar. $29^{in}{\cdot}83$ Th. $59^{\circ}{\cdot}7$.

(Then the sketches of each group).

Bar A.

⊙	9. 48. 20·0	9. 56. 20·0	10. 4. 20·0
P	48. 50·8	56. 50·7	4. 50·5
Q	48. 55·3	56. 55·1	4. 54·9
R	48. 58·9	56. 58·9	4. 58·8
S	49. 9·6	57. 9·5	5. 9·4
T	49. 14·8	57. 14·9	5. 15·0
U	49. 15·8*	57. 15·9	5. 16·0*
V	49. 43·3	57. 43·2	5. 43·1
W	50. 0·6	58. 0·8	6. 0·5
X	50. 21·4	58. 21·2	6. 21·0
ξ	50. 29·6	58. 29·2	6. 29·4*
Y	50. 40·5	58. 40·5	6. 40·3
ζ	50. 51·3	58. 51·3	6. 51·0
Z	50. 52·3	58. 51·9	6. 52·2
⊙	9. 51. 25·3	9. 59. 25·3	10. 7. 25·3
	+0·9	+1·2	−0·9

Bar B.

⊙	9. 52. 20·0	10. 0. 20·1
P	53. 24·9	1. 24·6
U	53. 31·2	1. 30·8*
Q	53. 46·3	1. 46·7
R	53. 58·8	1. 58·5
X	54. 1·6	2. 2·0*
W	54. 2·8	2. 2.7
ξ	54. 8·4*	2. 8·4*
S	54. 10·0	2. 10·1
T	54. 26·2	2. 26·7
Y	54. 29·0	2. 29·1
ζ	54. 48·6	2. 48·9
Z	54. 57·1	2. 57·2
V	55. 11·3	3. 11·6
⊙	9. 55. 28·2	10. 3. 28·0
	+1·9	−1·0

(The numbers in the last line are what it would be necessary to apply to the entered numbers above each, to reproduce the actual numbers of observation. An Asterisk

indicates that the number it is appended to was derived by differences with another nucleus, two or three passing too nearly together for both to be observed at the same time).

The advantage of entering the seconds slightly changed as above is that a faulty observation is at once detected, and that the means can be written down at sight.

On the left hand or opposite page of the same volume, the means are entered in the following order, with the required correction to Redhill Sidereal times.

1860. Aug. 9.

	A.	B.
$\odot_1$	9. 56. 20·000	9. 56. 20·05
P	56. 20·667	57. 24·75
Q	56. 55·100	57. 46·50
R	56. 58·867	57. 58·65
S	57. 9·500	58. 10·05
T	57. 14·900	58. 26·45
U	57. 15·900	57. 31·00
V	57. 43·200	59. 11·45
W	58. 0·633	58. 2·75
X	58. 21·200	58. 1·80
ζ	58. 29·400	58. 8·40
Y	58. 40·433	58. 29·05
ζ	58. 51·200	58. 48·75
Z	58. 52·133	58. 57·15
$\odot_2$	9. 59. 25·300	9. 59. 28·10
$\frac{1}{2}(\odot_1 + \odot_2)$	57. 52·650	57. 54·075
	Add $24^{m}\ 49^{s}·0$	

The Reduction as copied from the manuscript.

The first part which follows is general for all the spots.

	h. m. s.		° ′ ″		s.	
B ..	9. 57. 54·1	$\odot$ ..	137. 5. 43	$B_2 - B_1$ ..	188·050 ..	2·27428
A ..	52·7	N ..	74. 35. 47	$A_2 - A_1$ ..	185·300 ..	2·26788
	9. 57. 53·4	$\odot$ − N ..	62. 29. 56			0·00640
	+24. 49·0		° ′			° ′
	+—. 41·3	G ..	−17. 37·8		A ..	45. 25·3
						−14. 21·3
	10. 23. 23·6	H ..	+ 3. 19·4		A + G + H + ι ..	31. 4·0
	9. 12. 47·8	ι ..	− 2·9			° ′
∴	1. 11 .. G.M.T.		−14. 21·3		D ..	+ 6. 21·2
					L ..	242. 18·8

The following part is special to the two spots selected for illustration. (Refraction is neglected).

1860.	Spot V.		Spot W.		Aug. 9.
$b-$B $a-$A	$+77·375$ $-\ 9·450$	$+1·88860$ $-0·97543$	$+\ \ 8·675$ $+\ \ 7·983$	$+0·93827$ $+0·90217$	Log $(b-$B) Log $(a-$A)
Log $(b-$B) Log (B$_2-$B$_1$	1·88860 2·27428	$-0·91317$ 0·00640	0·93827 2·27428	$+0·03610$ 0·00640	Diff. Log tan A
Diff. Log cos a Log 2	9·61432 0·00331 0·30103	$-0·90677$ ——— (45.22·4)	8·66399 0·13617 0·30103	$+0·02970$ ——— (45.22·4)	Diff. —— (A + ι)
Log $\frac{r}{R}$ Log (R)	9·91866 1·199	97. 3·9 $+31.$ 4·0	9·10119 1·199	46. 57·5 $+31.$ 4·0	a A+G+H+ι
Log ρ'	1·118	128. 7·9	0·300	78. 1·5	χ
Log cos ρ Log sin D	9·74982 $+9·04399$	56. 1·0 13·1	9·99655 $+9·04399$	7. 15·1 2·0	$\rho+\rho'$ ρ'
Log (1)	$+8·79381$	55. 47·9	$+9·04054$	7. 13·1	ρ
Log cos χ Log sin ρ Log cos D	$-9·79061$ 9·91754 9·99733	$+9·89575$ 9.91754 0·04801	$+9·31699$ 9·09917 9·99733	$+9·99044$ 9·09917 0·00404	Log sin χ Log sin ρ Log cosec λ
Log (2)	$-9·70548$	$+9·86130$	$+8·41349$	$+9·09365$	Log sin (L$-l$)
(1) (2)	$+$ ·06220 $-$ ·50755	242. 18·8 $+46.$ 36·2	$+$ ·10978 $+$ ·02591	242. 18·8 $+7.$ 7·6	L (L$-l$)
Sum	$-$ ·44535	195. 43	$+$ ·13569	235. 11	l
Log sin λ	$-9·64870$	$-26.$ 27	$+9·13255$	$+7.$ 48	λ

The whole of the observations without any exception were reduced in the above manner in books ruled on the right hand pages for 3 spots to a page and 2 columns for each spot.* In the example I insert the symbols in place of the numbers for the third spot. Taking out the natural number $\frac{r}{R}$ from the logarithms and adding together (A+ι) and a, the above give the following two lines in the Catalogue of Spots:

No.	Dist.	Pos.	Hel. Long.	Hel. Lat.	Group.
		° ′	° ′	° ′	
4286	·8292	142. 26	195. 43	$-26.$ 27	790
4287	·1262	92. 20	235. 11	$+$ 7. 48	787

* It is curious to perceive in the first memoir of Lalande, that while intending the utmost brevity, he makes two steps of the latter part of the process, first computing the ecliptical longitude and latitude of the spot before passing finally to the heliographical. It will be noticed also that he omits the correction ρ'.

as they will there be found, and this ends the reduction. For further comparison and discussion, it is convenient next to clear the heliographical longitude of rotation, at least approximately, and for this purpose a near mean value $25^{d}\cdot380$ was provisionally adopted from its admitting conveniently of much subdivision without remainders. In Table 4 are given the epochs of the coincidence of the assumed prime meridian with the ascending Node of the Sun's Equator on this supposition of 25·38 mean solar days for the working period of rotation. As the fractions of the day are throughout counted in civil time from the preceding midnight 1854—$0^{d}\cdot00$ here signifies mean midnight on December 31st, 1853. In Table 5 are written, 1. the day and fraction from midnight of the observation; 2. the difference from the preceding epoch of Table 4; 3. this difference converted into rotation-angle in the proportion of 360° : $25^{d}\cdot38$, or the angle through which the prime meridian had rotated since its last coincidence with Node. The deduction of this amount for each day manifestly leaves us a heliographical longitude, reckoned in all cases from a prime meridian, which, if our period be correct, is constant, if incorrect, varies slowly with the time. The correctness or incorrectness of the period in any small degree is of no consequence at this stage of calculation.

I regard a catalogue of positions thus obtained as of little use without the corresponding figures of the spots, at the same time that it is impracticable to publish the disks singly as observed. I adopted the following arrangement which I hope to see approved and followed in future records of the Sun. Two features require to be illustrated, 1st. the position of the group on the Sun in reference to the Equator and to the assumed prime meridian; 2nd. the changes which each group is seen to undergo. Accordingly, I formed and here give two series of illustrations: 1st. a series of Rotations as observed, in which each group appears once for all in its observed position in its most typical aspect, and in which the meridians passing through the centre of the disk are indicated for every day; and 2nd. a series of plates in which each group observed more than once is fully shown by arranging the recorded figures of each day under one another in succession, from the top to the bottom of the page, the observation of the day when the group passed the centre of the disk occupying the middle square. This series of illustrations shows most forcibly the devastation of the record by the badness of the climate, it being a rare event for a continuous series to be obtained. The particular part of the nucleus of any spot which was observed, may always be found by comparison of these sheets with the Catalogue, and thus the reader is put in possession of all the information of the observer with the advantage of having it condensed and arranged for further inquiry.

Between the first and second of these series of diagrams I have interposed three other sheets giving a condensed view of the distribution in latitude, which though shown in the series of Rotations is not there in a form which the eye can catch at sight. In these plates the scale is materially changed by giving 1 inch vertical for 10 degrees of latitude, and $\frac{1}{2}$ inch horizontal for each rotation or 360 degrees of longitude. The

immediate result of this examination, which was published some years since, was to show a great contraction of the limiting parallels between which spots were formed for two years previously to the minimum of 1856, and soon after this epoch the apparent commencement of two fresh belts of spots in high latitudes North and South, which have in the subsequent years shown a tendency to coalesce and ultimately to contract as before to extinction. Whether this is what occurs at each period of increase and decrease of frequency of the Spots must be left to observers who may follow me to show. At present it is only probable that such is the case, and another contribution made to the facts on the broad scale which will ultimately elucidate the origin of this phenomenon and instruct us on the question, "What is a Sun?"

Note.—On the corrections required for Ellipticity of the Solar disk and for Refraction.

1. In fig. 7 let C D be drawn parallel to the minor axis of the elliptical disk and C D lying between C N and C A_2, let the angle N C D=D, then D C B_1=A+D and the angle which the major axis makes with Bar B=90°—(A+D).

If p_b denote the perpendicular from the centre of the disk on bar B at the instant of contact with bar B, and a and b are respectively the major and minor semiaxes, and $b^2=a^2\,(1-e^2)$, it is well known by the properties of the ellipse that

$$p_b = a.\,(1 - e^2.\,\sin^2 \overline{A + D})^{\frac{1}{2}}$$

and if p_a is the similar perpendicular on bar A that

$$p_a = a.\,(1 - e^2.\,\cos^2 \overline{A + D})^{\frac{1}{2}}$$

and in this case we must substitute for our previous equations the following:

$$2\,p_b = 15 \sin \delta.\,F.\,(B_2 - B_1) \sin A$$
$$2\,p_a = 15 \sin \delta.\,F.\,(A_2 - A_1) \sin A$$

from which if we write

$$\tan A' = \frac{B_2 - B_1}{A_2 - A_1}$$

we deduce

$$\tan A' = \tan A.\,(1 + \tfrac{1}{2}\,e^2.\,\cos 2.\,\overline{A + D})$$

and thence, forming tan (A′—A), lastly

$$A = A' + \frac{e^2}{4 \sin 1''}\,.\,\sin 2\,D$$

2. If the Sun's polar diameter is less than the equatorial diameter by one thousandth part, then

$$e^2 = \frac{1}{500}$$

and (G+H) being the angle before described, the correction for this assumed ellipticity will be

$$A - A' = +\,103''.\,\sin 2\,(G + H)$$

which will vary from +82″ to —82″ since 2. (G+H) varies from +53° to −53° (about).

The correction due to this circumstance is therefore negligible in daily computation, but may just affect elements of the Equator as it has a yearly period.

3. The effect of Refraction may be traced with sufficient accuracy by following out the general consideration that all distances on the disk parallel to the vertical will be proportionably shortened, while those parallel to the horizon will be unaffected. The angle D will in this case be the angle at the centre of the disk between the great circles drawn to the Pole and the Zenith, $+S$ for E hour angles, and $-S$ for West. The correction will be of two kinds. In the first place, the angle A or the deduced position of the bars will be affected, and secondly, the position angle and distance from centre of each spot.

If we take as an approximate expression for the refraction at any Zenith distance

$$57''\cdot5 \cdot \tan Z$$

we shall have as the relation of the axes of the disk

$$b = a\,(1 - k) \qquad \text{where } k = 57\cdot5 \sin 1''.\ \sec^2 Z$$

Whence the correction of the position of the bars, or

$$A - A' = +\,28''\cdot75\,.\ \sec^2 Z.\ \sin 2\,S$$

and each spot further requires the correction

$$+\,r\,.\,k\,.\,\cos\,(A + a + S) \text{ in distance from centre,}$$

and

$$-\,k\,.\,\sin\,(A + a + S) \text{ in position angle.}$$

Ex. In spots V and W, August 9th, 1860, take $\theta = +5'$ (the full value), and the compression as above assumed.

	Spot V.		Spot W.	
Uncorrected .	·8292	142°. 26′	·1262	92°. 20′
Correction for θ .	− ·0001	− 1·9	+ ·0001	− 0·2
„ Ellip. .	——	− 0·8	——	− 0·8
„ Refr. .	——	− 0·5	——	− 0·5
„ „ .	− ·0002	− 1·2	+ ·0000	− 1·5
Corrected .	·8289	142. 22	·1263	92. 17

In remarking the total amount of the three corrections, it will be noticed that in the cases selected there happens a concurrence of negative signs.

Quantities used in reducing Sun Spots.

TABLE I.

$\Delta\odot$ = hourly increment of longitude, for interpolating $\odot$.
ι = inclination of Sun's path to a parallel of Declination.
Log (R) = Log semi-diameter in minutes of arc.
N = 74°. 30′ for 1854·0.

$\Delta\odot$	ι	Log. (R)	Day.	True Node. 1854.	1855.	1856.
″	′			° ′ ″	° ′ ″	° ′ ″
153	+0·9	1·212	Jan. 1	74. 29. 44	74. 30. 38	74. 31. 32
153	+1·6	1·212	11	29. 46	30. 40	31. 34
153	+2·3	1·212	21	29. 48	30. 41	31. 36
152	+2·8	1·211	31	29. 50	30. 43	31. 38
152	+3·3	1·211	Feb. 10	29. 51	30. 44	31. 39
151	+3·5	1·210	20	29. 52	30. 46	31. 41
150	+3·7	1·209	Mar. 2	29. 53	30. 47	31. 42
149	+3·8	1·207	12	29. 54	30. 48	31. 43
149	+3·8	1·206	22	29. 55	30. 49	31. 44
148	+3·7	1·205	Apr. 1	29. 57	30. 50	31. 45
147	+3·5	1·204	11	29. 58	30. 51	31. 46
146	+3·3	1·203	21	29. 59	30. 53	31. 48
145	+3·0	1·201	May 1	30. 0	30. 54	31. 49
145	+2·6	1·200	11	30. 2	30. 55	31. 51
144	+2·1	1·199	21	30. 3	30. 57	31. 52
144	+1·5	1·199	31	30. 5	30. 59	31. 54
143	+0·8	1·198	June 10	30. 7	31. 1	31. 56
143	+0·1	1·198	20	30. 9	31. 3	31. 58
143	−0·6	1·198	30	30. 10	31. 4	32. 0
143	−1·3	1·198	July 10	30. 12	31. 6	32. 2
143	−1·9	1·198	20	30. 14	31. 8	32. 3
144	−2·5	1·199	30	30. 16	31. 10	32. 5
144	−2·9	1·199	Aug. 9	30. 17	31. 11	32. 7
145	−3·2	1·200	19	30. 19	31. 13	32. 8
145	−3·5	1·201	29	30. 20	31. 14	32. 9
146	−3·6	1·202	Sept. 8	30. 21	31. 15	32. 11
147	−3·7	1·203	18	30. 22	31. 16	32. 12
148	−3·7	1·204	28	30. 23	31. 17	32. 13
149	−3·7	1·206	Oct. 8	30. 24	31. 19	32. 14
149	−3·5	1·207	18	30. 25	31. 20	32. 15
150	−3·3	1·208	28	30. 27	31. 21	32. 16
151	−2·9	1·209	Nov. 7	30. 28	31. 22	32. 18
151	−2·5	1·210	17	30. 29	31. 24	32. 19
152	−1·9	1·211	27	30. 31	31. 26	32. 21
152	−1·1	1·212	Dec. 7	30. 33	31. 28	32. 23
153	−0·3	1·212	17	30. 35	31. 29	32. 25
153	+0·5	1·212	27	74. 30. 37	74. 31. 31	74. 32. 27

Quantities used in reducing Sun Spots.

TABLE I.—*continued.*

	True Node				
At	1857.	1858.	1859.	1860.	1861.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Jan. 1	74. 32. 28	74. 33. 24	74. 34. 20	74. 35. 14	74. 36. 8
11	32. 30	33. 26	34. 22	35. 15	36. 9
21	32. 31	33. 27	34. 23	35. 17	36. 11
31	32. 33	33. 29	34. 25	35. 18	36. 12
Feb. 10	32. 34	33. 30	34. 26	35. 20	36. 14
20	32. 36	33. 32	34. 28	35. 21	36. 15
Mar. 2	32. 37	33. 33	34. 29	35. 23	36. 17
12	32. 39	33. 35	34. 31	35. 24	36. 18
22	32. 40	33. 36	34. 32	35. 26	36. 20
Apr. 1	32. 42	33. 38	34. 34	35. 27	74. 36. 21
11	32. 43	33. 39	34. 35	35. 29	—
21	32. 45	33. 41	34. 37	35. 30	
May 1	32. 46	33. 42	34. 38	35. 32	
11	32. 48	33. 44	34. 40	35. 33	
21	32. 49	33. 45	34. 41	35. 35	
31	32. 51	33. 47	34. 43	35. 36	
June 10	32. 52	33. 48	34. 44	35. 38	
20	32. 54	33. 50	34. 46	35. 39	
30	32. 55	33. 51	34. 47	35. 41	
July 10	32. 57	33. 53	34. 49	35. 42	
20	32. 58	33. 54	34. 50	35. 44	
30	33. 0	33. 56	34. 52	35. 45	
Aug. 9	33. 1	33. 57	34. 53	35. 47	
19	33. 3	33. 59	34. 55	35. 48	
29	33. 4	34. 0	34. 56	35. 50	
Sept. 8	33. 6	34. 2	34. 58	35. 51	1853.
18	33. 7	34. 3	34. 59	35. 53	—
28	33. 9	34. 5	35. 1	35. 54	74. 29. 29
Oct. 8	33. 10	34. 6	35. 2	35. 56	29. 30
18	33. 12	34. 8	35. 4	35. 57	29. 32
28	33. 13	34. 9	35. 5	35. 58	29. 33
Nov. 7	33. 15	34. 11	35. 7	36. 0	29. 35
17	33. 16	34. 12	35. 8	36. 1	29. 36
27	33. 18	34. 14	35. 10	36. 3	29. 38
Dec. 7	33. 19	34. 15	35. 11	36. 4	29. 39
17	33. 21	34. 17	35. 13	36. 6	29. 41
27	74. 33. 22	74. 34. 18	74. 35. 14	74. 36. 7	74. 29. 42

In interpolating ☉ from the Naut. Alm., 20″ was added for aberration.

TABLE II.

The Angle G.

☉	G.	☉	G.	☉	G.	☉	G.
°	° ′	°	° ′	°	° ′	°	° ′
0	+23. 27·6	45	+17. 3·6	90	0. 0·0	135	−17. 3·6
1	+23. 27·4	46	+16. 46·6	91	− 0. 26·0	136	−17. 20·2
2	+23. 26·9	47	+16. 29·2	92	− 0. 52·1	137	−17. 36·5
3	+23. 25·9	48	+16. 11·5	93	− 1. 18·1	138	−17. 52·5
4	+23. 24·6	49	+15. 53·5	94	− 1. 44·1	139	−18. 8·1
5	+23. 22·8	50	+15. 35·2	95	− 2. 10·0	140	−18. 23·4
6	+23. 20·7	51	+15. 16·5	96	− 2. 35·9	141	−18. 38·3
7	+23. 18·2	52	+14. 57·5	97	− 3. 1·7	142	−18. 52·8
8	+23. 15·4	53	+14. 38·2	98	− 3. 27·4	143	−19. 7·0
9	+23. 12·1	54	+14. 18·6	99	− 3. 53·0	144	−19. 20·8
10	+23. 8·5	55	+13. 58·7	100	− 4. 18·6	145	−19. 34·2
11	+23. 4·5	56	+13. 38·5	101	− 4. 44·0	146	−19. 47·3
12	+23. 0·1	57	+13. 17·9	102	− 5. 9·3	147	−20. 0·0
13	+22. 55·3	58	+12. 57·1	103	− 5. 34·5	148	−20. 12·3
14	+22. 50·1	59	+12. 36·0	104	− 5. 59·6	149	−20. 24·3
15	+22. 44·6	60	+12. 14·6	105	− 6. 24·5	150	−20. 35·9
16	+22. 38·7	61	+11. 52·9	106	− 6. 49·3	151	−20. 47·1
17	+22. 32·4	62	+11. 31·0	107	− 7. 13·9	152	−20. 57·9
18	+22. 25·7	63	+11. 8·8	108	− 7. 38·3	153	−21. 8·4
19	+22. 18·6	64	+10. 46·3	109	− 8. 2·5	154	−21. 18·5
20	+22. 11·1	65	+10. 23·6	110	− 8. 26·6	155	−21. 28·3
21	+22. 3·3	66	+10. 0·7	111	− 8. 50·4	156	−21. 37·6
22	+21. 55·1	67	+ 9. 37·5	112	− 9. 14·1	157	−21. 46·6
23	+21. 46·6	68	+ 9. 14·1	113	− 9. 37·5	158	−21. 55·1
24	+21. 37·6	69	+ 8. 50·4	114	−10. 0·7	159	−22. 3·3
25	+21. 28·3	70	+ 8. 26·6	115	−10. 23·6	160	−22. 11·1
26	+21. 18·5	71	+ 8. 2·5	116	−10. 46·3	161	−22. 18·6
27	+21. 8·4	72	+ 7. 38·3	117	−11. 8·8	162	−22. 25·7
28	+20. 57·9	73	+ 7. 13·9	118	−11. 31·0	163	−22. 32·4
29	+20. 47·1	74	+ 6. 49·3	119	−11. 52·9	164	−22. 38·7
30	+20. 35·9	75	+ 6. 24·5	120	−12. 14·6	165	−22. 44·6
31	+20. 24·3	76	+ 5. 59·6	121	−12. 36·0	166	−22. 50·1
32	+20. 12·3	77	+ 5. 34·5	122	−12. 57·1	167	−22. 55·3
33	+20. 0·0	78	+ 5. 9·3	123	−13. 17·9	168	−23. 0·1
34	+19. 47·3	79	+ 4. 44·0	124	−13. 38·5	169	−23. 4·5
35	+19. 34·2	80	+ 4. 18·6	125	−13. 58·7	170	−23. 8·5
36	+19. 20·8	81	+ 3. 53·0	126	−14. 18·6	171	−23. 12·1
37	+19. 7·0	82	+ 3. 27·4	127	−14. 38·2	172	−23. 15·4
38	+18. 52·8	83	+ 3. 1·7	128	−14. 57·5	173	−23. 18·2
39	+18. 38·3	84	+ 2. 35·9	129	−15. 16·5	174	−23. 20·7
40	+18. 23·4	85	+ 2. 10·0	130	−15. 35·2	175	−23. 22·8
41	+18. 8·1	86	+ 1. 44·1	131	−15. 53·5	176	−23. 24·6
42	+17. 52·5	87	+ 1. 18·1	132	−16. 11·5	177	−23. 25·9
43	+17. 36·5	88	+ 0. 52·1	133	−16. 29·2	178	−23. 26·9
44	+17. 20·2	89	+ 0. 26·0	134	−16. 46·6	179	−23. 27·4
45	+17. 3·6	90	0. 0·0	135	−17. 3·6	180	−23. 27·6

Table II.—*continued.*

⊙	G.	⊙	G.	⊙	G.	⊙	G.
°	° ′	°	° ′	°	° ′	°	° ′
180	−23. 27·6	225	−17. 3·6	270	0. 0·0	315	+17. 3·6
181	−23. 27·4	226	−16. 46·6	271	+ 0. 26·0	316	+17. 20·2
182	−23. 26·9	227	−16. 29·2	272	+ 0. 52·1	317	+17. 36·5
183	−23. 25·9	228	−16. 11·5	273	+ 1. 18·1	318	+17. 52·5
184	−23. 24·6	229	−15. 53·5	274	+ 1. 44·1	319	+18. 8·1
185	−23. 22·8	230	−15. 35·2	275	+ 2. 10·0	320	+18. 23·4
186	−23. 20·7	231	−15. 16·5	276	+ 2. 35·9	321	+18. 38·3
187	−23. 18·2	232	−14. 57·5	277	+ 3. 1·7	322	+18. 52·8
188	−23. 15·4	233	−14. 38·2	278	+ 3. 27·4	323	+19. 7·0
189	−23. 12·1	234	−14. 18·6	279	+ 3. 53·0	324	+19. 20·8
190	−23. 8·5	235	−13. 58·7	280	+ 4. 18·6	325	+19. 34·2
191	−23. 4·5	236	−13. 38·5	281	+ 4. 44·0	326	+19. 47·3
192	−23. 0·1	237	−13. 17·9	282	+ 5. 9·3	327	+20. 0·0
193	−22. 55·3	238	−12. 57·1	283	+ 5. 34·5	328	+20. 12·3
194	−22. 50·1	239	−12. 36·0	284	+ 5. 59·6	329	+20. 24·3
195	−22. 44·6	240	−12. 14·6	285	+ 6. 24·5	330	+20. 35·9
196	−22. 38·7	241	−11. 52·9	286	+ 6. 49·3	331	+20. 47·1
197	−22. 32·4	242	−11. 31·0	287	+ 7. 13·9	332	+20. 57·9
198	−22. 25·7	243	−11. 8·8	288	+ 7. 38·3	333	+21. 8·4
199	−22. 18·6	244	−10. 46·3	289	+ 8. 2·5	334	+21. 18·5
200	−22. 11·1	245	−10. 23·6	290	+ 8. 26·6	335	+21. 28·3
201	−22. 3·3	246	−10. 0·7	291	+ 8. 50·4	336	+21. 37·6
202	−21. 55·1	247	− 9. 37·5	292	+ 9. 14·1	337	+21. 46·6
203	−21. 46·6	248	− 9. 14·1	293	+ 9. 37·5	338	+21. 55·1
204	−21. 37·6	249	− 8. 50·4	294	+10. 0·7	339	+22. 3·3
205	−21. 28·3	250	− 8. 26·6	295	+10. 23·6	340	+22. 11·1
206	−21. 18·5	251	− 8. 2·5	296	+10. 46·3	341	+22. 18·6
207	−21. 8·4	252	− 7. 38·3	297	+11. 8·8	342	+22· 25·7
208	−20. 57·9	253	− 7. 13·9	298	+11. 31·0	343	+22. 32·4
209	−20. 47·1	254	− 6. 49·3	299	+11. 52·9	344	+22. 38·7
210	−20. 35·9	255	− 6. 24·5	300	+12. 14·6	345	+22. 44·6
211	−20. 24·3	256	− 5. 59·6	301	+12. 36·0	346	+22. 50·1
212	−20. 12·3	257	− 5. 34·5	302	+12. 57.1	347	+22. 55·3
213	−20. 0·0	258	− 5. 9·3	303	+13. 17·9	348	+23. 0·1
214	−19. 47·3	259	− 4. 44·0	304	+13. 38·5	349	+23. 4·5
215	−19. 34·2	260	− 4. 18·6	305	+13. 58·7	350	+23. 8·5
216	−19. 20·8	261	− 3. 53·0	306	+14. 18·6	351	+23. 12·1
217	−19. 7·0	262	− 3. 27·4	307	+14. 38·2	352	+23. 15·4
218	−18. 52·8	263	− 3. 1·7	308	+14. 57·5	353	+23. 18·2
219	−18. 38·3	264	− 2. 35·9	309	+15. 16.5	354	+23. 20·7
220	−18. 23·4	265	− 2. 10·0	310	+15. 35·2	355	+23. 22·8
221	−18. 8·1	266	− 1. 44·1	311	+15. 53·5	356	+23. 24·6
222	−17. 52·5	267	− 1. 18·1	312	+16. 11·5	357	+23. 25·9
223	−17. 36·5	268	− 0. 52·1	313	+16. 29·2	358	+23. 26·9
224	−17. 20·2	269	− 0. 26·0	314	+16. 46·6	359	+23. 27·4
225	−17. 3·6	270	0. 0·0	315	+17. 3.6	360	+23. 27·6

TABLE III.

The Angles H, D, *and* L.

⊙−N.	H.	D.	L.	⊙−N.	H.	D.	L.
°	° ′	° ′	° ′	°	° ′	° ′	° ′
0	+7. 10·0	0. 0·0	180. 0·0	45	+5. 4·9	+5. 3·7	224. 46·5
1	+7. 9·9	+0. 7·5	180. 59·5	46	+4. 59·5	+5. 8·9	225. 46·5
2	+7. 9·7	+0. 15·0	181. 59·0	47	+4. 54·1	+5. 14·1	226. 46·5
3	+7. 9·4	+0. 22·4	182. 58·6	48	+4. 48·5	+5. 19·2	227. 46·5
4	+7. 9·0	+0. 29·9	183. 58·1	49	+4. 42·9	+5. 24·2	228. 46·6
5	+7. 8·4	+0. 37·4	184. 57·7	50	+4. 37·2	+5. 29·1	229. 46·7
6	+7. 7·7	+0. 44·9	185. 57·2	51	+4. 31·5	+5. 33·8	230. 46·8
7	+7. 6·8	+0. 52·3	186. 56·7	52	+4. 25·6	+5. 38·5	231. 46·9
8	+7. 5·9	+0. 59·7	187. 56·2	53	+4. 19·6	+5. 43·1	232. 47·0
9	+7. 4·8	+1. 7·1	188. 55·8	54	+4. 13·6	+5. 47·6	233. 47·1
10	+7. 3·6	+1. 14·5	189. 55·4	55	+4. 7·5	+5. 51·9	234. 47·3
11	+7. 2·2	+1. 21·8	190. 55·0	56	+4. 1·3	+5. 56·1	235. 47·4
12	+7. 0·7	+1. 29.2	191. 54·5	57	+3. 55·1	+6. 0·3	236. 47·6
13	+6. 59·1	+1. 36·5	192. 54·1	58	+3. 48·7	+6. 4·4	237. 47·8
14	+6. 57·4	+1. 43.8	193. 53·7	59	+3. 42.3	+6. 8·3	238. 48·1
15	+6. 55·5	+1. 51.0	194. 53.3	60	+3. 35·8	+6. 12·2	239. 48·3
16	+6. 53·5	+1. 58·2	195. 52·9	61	+3. 29·3	+6. 15·9	240. 48·5
17	+6. 51·4	+2. 5·4	196. 52·5	62	+3. 22·7	+6. 19·5	241. 48·7
18	+6. 49·2	+2. 12·6	197. 52·1	63	+3. 16·0	+6. 22·9	242. 49·0
19	+6. 46·8	+2. 19·7	198. 51·7	64	+3. 9·3	+6. 26·3	243. 49·3
20	+6. 44·3	+2. 26·8	199. 51·3	65	+3. 2·5	+6. 29·5	244. 49·6
21	+6. 41·7	+2. 33·8	200. 51·0	66	+2. 55·7	+6. 32·7	245. 49·9
22	+6. 39.0	+2. 40·7	201. 50·6	67	+2. 48·8	+6. 35·7	246. 50·3
23	+6. 36·1	+2. 47·6	202. 50·3	68	+2. 41·8	+6. 38·6	247. 50.6
24	+6. 33·2	+2. 54·5	203. 50·0	69	+2. 34·8	+6. 41·3	248. 50·9
25	+6. 30·1	+3. 1·3	204. 49·7	70	+2. 27·8	+6. 44·0	249. 51·3
26	+6. 26·9	+3. 8·1	205. 49·4	71	+2. 20·7	+6. 46·5	250. 51·7
27	+6. 23·5	+3. 14·8	206. 49·1	72	+2. 13·5	+6. 48·9	251. 52·0
28	+6. 20·1	+3. 21·5	207. 48·8	73	+2. 6·3	+6. 51·1	252. 52·4
29	+6. 16·5	+3. 28·1	208. 48·6	74	+1. 59·1	+6. 53·3	253. 52·8
30	+6. 12·9	+3. 34·6	209. 48·3	75	+1. 51·8	+6. 55·3	254. 53·2
31	+6. 9·1	+3. 41·1	210. 48·1	76	+1. 44·5	+6. 57·2	255. 53·6
32	+6. 5·2	+3. 47·5	211. 47·9	77	+1. 37·2	+6. 58·9	256. 54·1
33	+6. 1·2	+3. 53·8	212. 47·7	78	+1. 29.9	+7. 0·6	257. 54·5
34	+5. 57·1	+4. 0·0	213. 47.5	79	+1. 22·5	+7. 2·1	258. 54·9
35	+5. 52·8	+4. 6·2	214. 47·4	80	+1. 15·1	+7. 3·5	259. 55·3
36	+5. 48·5	+4. 12·3	215. 47.2	81	+1. 7·6	+7. 4·7	260. 55·8
37	+5. 44.1	+4. 18·3	216. 47·0	82	+1. 0·2	+7. 5·8	261. 56·2
38	+5. 39·6	+4. 24·3	217. 46·9	83	+0. 52·7	+7. 6·8	262. 56·7
39	+5. 34·9	+4. 30·2	218. 46·8	84	+0. 45·2	+7. 7·6	263. 57·2
40	+5. 30·2	+4. 36·0	219. 46·7	85	+0. 37·7	+7. 8·3	264. 57·7
41	+5. 25·3	+4. 41·7	220. 46·6	86	+0. 30·2	+7. 8·9	265. 58·1
42	+5. 20·3	+4. 47.3	221. 46·6	87	+0. 22·6	+7. 9·4	266. 58·6
43	+5. 15·2	+4. 52·9	222. 46·6	88	+0. 15·1	+7. 9·7	267. 59·0
44	+5. 10·1	+4. 58·3	223. 46·5	89	+0. 7·6	+7. 9·9	268. 59·5
45	+5. 4·9	+5. 3·7	224. 46·5	90	0. 0·0	+7. 10·0	270. 0·0

TABLE III.—*continued.*

☉—N.	H.	D.	L.	☉—N.	H.	D.	L.
°	° ′	° ′	° ′	°	° ′	° ′	° ′
90	0. 0·0	+7. 10·0	270. 0·0	135	−5. 4·9	+5. 3·7	315. 13·5
91	−0. 7·6	+7. 9·9	271. 0·5	136	−5. 10·1	+4. 58·3	316. 13·5
92	−0. 15·1	+7. 9·7	272. 1·0	137	−5. 15·2	+4. 52·9	317. 13·5
93	−0. 22·6	+7. 9·4	273. 1·4	138	−5. 20·3	+4. 47·3	318. 13·4
94	−0. 30·2	+7. 8·9	274. 1·9	139	−5. 25·3	+4. 41·7	319. 13·4
95	−0. 37·7	+7. 8·3	275. 2·3	140	−5. 30·2	+4. 36·0	320. 13·3
96	−0. 45·2	+7. 7·6	276. 2·8	141	−5. 34·9	+4. 30·2	321. 13·2
97	−0. 52·7	+7. 6·8	277. 3·3	142	−5. 39·6	+4. 24·3	322. 13·1
98	−1. 0·2	+7. 5·8	278. 3·8	143	−5. 44·1	+4. 18·3	323. 13·0
99	−1. 7·6	+7. 4·7	279. 4·2	144	−5. 48·5	+4. 12·3	324. 12·9
100	−1. 15·1	+7. 3·5	280. 4·7	145	−5. 52·8	+4. 6·2	325. 12·7
101	−1. 22·5	+7. 2·1	281. 5·1	146	−5. 57·1	+4. 0·0	326. 12·6
102	−1. 29·9	+7. 0·6	282. 5·5	147	−6. 1·2	+3. 53·8	327. 12·4
103	−1. 37·2	+6. 58·9	283. 5·9	148	−6. 5·2	+3. 47·5	328. 12·2
104	−1. 44·5	+6. 57·2	284. 6·4	149	−6. 9·1	+3. 41·1	329. 11·9
105	−1. 51·8	+6. 55·3	285. 6·8	150	−6. 12·9	+3. 34·6	330. 11·7
106	−1. 59·1	+6. 53·3	286. 7·2	151	−6. 16·5	+3. 28·1	331. 11·5
107	−2. 6·3	+6. 51·1	287. 7·6	152	−6. 20·1	+3. 21·5	332. 11·3
108	−2. 13·5	+6. 48·9	288. 8·0	153	−6. 23·5	+3. 14·8	333. 11·0
109	−2. 20·7	+6. 46·5	289. 8·3	154	−6. 26·9	+3. 8·1	334. 10·7
110	−2. 27·8	+6. 44·0	290. 8·7	155	−6. 30·1	+3. 1·3	335. 10·4
111	−2. 34·8	+6. 41·3	291. 9·1	156	−6. 33·2	+2. 54·5	336. 10·1
112	−2. 41·8	+6. 38·6	292. 9·4	157	−6. 36·1	+2. 47·6	337. 9·7
113	−2. 48·8	+6. 35·7	293. 9·7	158	−6. 39·0	+2. 40·7	338. 9·4
114	−2. 55·7	+6. 32·7	294. 10·1	159	−6. 41·7	+2. 33·8	339. 9·1
115	−3. 2·5	+6. 29·5	295. 10·4	160	−6. 44·3	+2. 26·8	340. 8·7
116	−3. 9·3	+6. 26·3	296. 10·7	161	−6. 46·8	+2. 19·7	341. 8·3
117	−3. 16·0	+6. 22·9	297. 11·0	162	−6. 49·2	+2. 12·6	342. 8·0
118	−3. 22·7	+6. 19·5	298. 11·3	163	−6. 51·4	+2. 5·4	343. 7·6
119	−3. 29·3	+6. 15·9	299. 11·5	164	−6. 53·5	+1. 58·2	344. 7·2
120	−3. 35·8	+6. 12·2	300. 11·7	165	−6. 55·5	+1. 51·0	345. 6·8
121	−3. 42·3	+6. 8·3	301. 11·9	166	−6. 57·4	+1. 43·8	346. 6·4
122	−3. 48·7	+6. 4·4	302. 12·2	167	−6. 59·1	+1. 36·5	347. 5·9
123	−3. 55·1	+6. 0·3	303. 12·4	168	−7. 0·7	+1. 29·2	348. 5·5
124	−4. 1·3	+5. 56·1	304. 12·6	169	−7. 2·2	+1. 21·8	349. 5·1
125	−4. 7·5	+5. 51·9	305. 12·7	170	−7. 3·6	+1. 14·5	350. 4·7
126	−4. 13·6	+5. 47·6	306. 12·9	171	−7. 4·8	+1. 7·1	351. 4·2
127	−4. 19·6	+5. 43·1	307. 13·0	172	−7. 5·9	+0. 59·7	352. 3·8
128	−4. 25·6	+5. 38·5	308. 13·1	173	−7. 6·8	+0. 52·3	353. 3·3
129	−4. 31·5	+5. 33·8	309. 13·2	174	−7. 7·7	+0. 44·9	354. 2·8
130	−4. 37·2	+5. 29·1	310. 13·3	175	−7. 8·4	+0. 37·4	355. 2·3
131	−4. 42·9	+5. 24·2	311. 13·4	176	−7. 9·0	+0. 29·9	356. 1·9
132	−4. 48·5	+5. 19·2	312. 13·4	177	−7. 9·4	+0. 22·4	357. 1·4
133	−4. 54·1	+5. 14·1	313. 13·5	178	−7. 9·7	+0. 15·0	358. 1·0
134	−4. 59·5	+5. 8·9	314. 13·5	179	−7. 9·9	+0. 7·5	359. 0·5
135	−5. 4·9	+5. 3·7	315. 13·5	180	−7. 10·0	0. 0·0	360. 0·0

TABLE III.—*continued.*

⊙−N	II.	D.	L.	⊙−N	H.	D.	L.
°	° ′	° ′	° ′	°	° ′	° ′	° ′
180	−7. 10·0	0. 0·0	0. 0·0	225	−5. 4·9	−5. 3·7	44. 46·5
181	−7. 9·9	−0. 7·5	0. 59·5	226	−4. 59·5	−5. 8·9	45. 46·5
182	−7. 9·7	−0. 15·0	1. 59·0	227	−4. 54·1	−5. 14·1	46. 46·5
183	−7. 9·4	−0. 22·4	2. 58·6	228	−4. 48·5	−5. 19·2	47. 46·6
184	−7. 9·0	−0. 29·9	3. 58·1	229	−4. 42·9	−5. 24·2	48. 46·6
185	−7. 8·4	−0. 37·4	4. 57·7	230	−4. 37·2	−5. 29·1	49. 46·7
186	−7. 7·7	−0. 44·9	5. 57·2	231	−4. 31·5	−5. 33·8	50. 46·8
187	−7. 6·8	−0. 52·3	6. 56·7	232	−4. 25·6	−5. 38·5	51. 46·9
188	−7. 5·9	−0. 59·7	7. 56·2	233	−4. 19·6	−5. 43·1	52. 47·0
189	−7. 4·8	−1. 7·1	8. 55·8	234	−4. 13·6	−5. 47·6	53. 47·1
190	−7. 3·6	−1. 14·5	9. 55·4	235	−4. 7·5	−5. 51·9	54. 47·3
191	−7. 2·2	−1. 21·8	10. 55·0	236	−4. 1·3	−5. 56·1	55. 47·4
192	−7. 0·7	−1. 29·2	11. 54·5	237	−3. 55·1	−6. 0·3	56. 47·6
193	−6. 59·1	−1. 36·5	12. 54·1	238	−3. 48·7	−6. 4·4	57. 47·8
194	−6. 57·4	−1. 43·8	13. 53·7	239	−3. 42·3	−6. 8·3	58. 48·1
195	−6. 55·5	−1. 51·0	14. 53·3	240	−3. 35·8	−6. 12·2	59. 48·3
196	−6. 53·5	−1. 58·2	15. 52·9	241	−3. 29·3	−6. 15·9	60. 48·5
197	−6. 51·4	−2. 5·4	16. 52·5	242	−3. 22·7	−6. 19·5	61. 48·7
198	−6. 49·2	−2. 12·6	17· 52·1	243	−3. 16·0	−6. 22·9	62. 49·0
199	−6. 46·8	−2. 19·7	18. 51·7	244	−3. 9·3	−6. 26·3	63. 49·3
200	−6. 44·3	−2. 26·8	19. 51·3	245	−3. 2·5	−6. 29·5	64. 49·6
201	−6. 41·7	−2. 33·8	20. 51·0	246	−2. 55·7	−6. 32·7	65. 49·9
202	−6. 39·0	−2. 40·7	21. 50·6	247	−2. 48·8	−6. 35·7	66. 50·3
203	−6. 36·1	−2. 47·6	22. 50·3	248	−2. 41·8	−6. 38·6	67. 50·6
204	−6. 33·2	−2. 54·5	23. 50·0	249	−2. 34·8	−6. 41·3	68. 50·9
205	−6. 30·1	−3. 1·3	24. 49·7	250	−2. 27·8	−6. 44·0	69. 51·3
206	−6. 26·9	−3. 8·1	25. 49·4	251	−2. 20·7	−6. 46·5	70. 51·7
207	−6. 23·5	−3. 14·8	26. 49·1	252	−2. 13·5	−6. 48·9	71. 52·0
208	−6. 20·1	−3. 21·5	27. 48·8	253	−2. 6·3	−6. 51·1	72. 52·4
209	−6. 16·5	−3. 28·1	28. 48·6	254	−1. 59·1	−6. 53·3	73. 52·8
210	−6. 12·9	−3. 34·6	29. 48·3	255	−1. 51·8	−6. 55·3	74. 53·2
211	−6. 9·1	−3. 41·1	30. 48·1	256	−1. 44·5	−6. 57·2	75. 53·6
212	−6. 5·2	−3. 47·5	31. 47·9	257	−1. 37·2	−6. 58·9	76. 54·1
213	−6. 1·2	−3. 53·8	32. 47·7	258	−1. 29·9	−7. 0·6	77. 54·5
214	−5. 57·1	−4. 0·0	33. 47·5	259	−1. 22·5	−7. 2·1	78. 54·9
215	−5. 52·8	−4. 6·2	34. 47·4	260	−1. 15·1	−7. 3·5	79. 55·3
216	−5. 48·5	−4. 12·3	35. 47·2	261	−1. 7·6	−7. 4·7	80. 55·8
217	−5. 44·1	−4. 18·3	36. 47·0	262	−1. 0·2	−7. 5·8	81. 56·2
218	−5. 39·6	−4. 24·3	37. 46·9	263	−0. 52·7	−7. 6·8	82. 56·7
219	−5. 34·9	−4. 30·2	38. 46·8	264	−0. 45·2	−7. 7·6	83. 57·2
220	−5. 30·2	−4. 36·0	39. 46·7	265	−0. 37·7	−7. 8·3	84. 57·7
221	−5. 25·3	−4. 41·7	40. 46·6	266	−0. 30·2	−7. 8·9	85. 58·1
222	−5. 20·3	−4. 47·3	41. 46·6	267	−0. 22·6	−7. 9·4	86. 58·6
223	−5. 15·2	−4. 52·9	42. 46·5	268	−0. 15·1	−7. 9·7	87. 59·0
224	−5. 10·1	−4. 58·3	43. 46·5	269	−0. 7·6	−7. 9·9	88. 59·5
225	−5. 4·9	−5. 3·7	44. 46·5	270	0. 0·0	−7. 10·0	90. 0·0

Table III.—*continued.*

⊙—N	H.	D.	L.	⊙—N	H.	D.	L.
°	° ′	° ′	° ′	°	° ′	° ′	° ′
270	0. 0·0	−7. 10·0	90. 0·0	315	+5. 4·9	−5. 3·7	135. 13·5
271	+0. 7·6	−7. 9·9	91. 0·5	316	+5. 10·1	−4. 58·3	136. 13·5
272	+0. 15·1	−7. 9·7	92. 1·0	317	+5. 15·2	−4. 52·9	137. 13·5
273	+0. 22·6	−7. 9·4	93. 1·4	318	+5. 20·3	−4. 47·3	138. 13·4
274	+0. 30·2	−7. 8·9	94. 1·9	319	+5. 25·3	−4. 41·7	139. 13·4
275	+0. 37·7	−7. 8·3	95. 2·3	320	+5. 30·2	−4. 36·0	140. 13·3
276	+0. 45·2	−7. 7·6	96. 2·8	321	+5. 34·9	−4. 30·2	141. 13·2
277	+0. 52·7	−7. 6·8	97. 3·3	322	+5. 39·6	−4. 24·3	142. 13·1
278	+1. 0·2	−7. 5·8	98. 3·8	323	+5. 44·1	−4. 18·3	143. 13·0
279	+1. 7·6	−7. 4·7	99. 4·2	324	+5. 48·5	−4. 12·3	144. 12·9
280	+1. 15·1	−7. 3·5	100. 4·7	325	+5. 52·8	−4. 6·2	145. 12·7
281	+1. 22·5	−7. 2·1	101. 5·1	326	+5. 57·1	−4. 0·0	146. 12·6
282	+1. 29·9	−7. 0·6	102. 5·5	327	+6. 1·2	−3. 53·8	147. 12·4
283	+1. 37·2	−6. 58·9	103. 5·9	328	+6. 5·2	−3. 47·5	148. 12·2
284	+1. 44·5	−6. 57·2	104. 6·4	329	+6. 9·1	−3. 41·1	149. 11·9
285	+1. 51·8	−6. 55·3	105. 6·8	330	+6. 12·9	−3. 34·6	150. 11·7
286	+1. 59·1	−6. 53·3	106. 7·2	331	+6. 16·5	−3. 28·1	151. 11·5
287	+2. 6·3	−6. 51·1	107. 7·6	332	+6. 20·1	−3. 21·5	152. 11·3
288	+2. 13·5	−6. 48·9	108. 8·0	333	+6. 23·5	−3. 14·8	153. 11·0
289	+2. 20·7	−6. 46·5	109. 8·3	334	+6. 26·9	−3. 8·1	154. 10·7
290	+2. 27·8	−6. 44·0	110. 8·7	335	+6. 30·1	−3. 1·3	155. 10·4
291	+2. 34·8	−6. 41·3	111. 9·1	336	+6. 33·2	−2. 54·5	156. 10·1
292	+2. 41·8	−6. 38·6	112. 9·4	337	+6. 36·1	−2. 47·6	157. 9·7
293	+2. 48·8	−6. 35·7	113. 9·7	338	+6. 39·0	−2. 40·7	158. 9·4
294	+2. 55·7	−6. 32·7	114. 10·1	339	+6. 41·7	−2. 33·8	159. 9·1
295	+3. 2·5	−6. 29·5	115. 10·4	340	+6. 44·3	−2. 26·8	160. 8·7
296	+3. 9·3	−6. 26·3	116. 10·7	341	+6. 46·8	−2. 19·7	161. 8·3
297	+3. 16·0	−6. 22·9	117. 11·0	342	+6. 49·2	−2. 12·6	162. 8·0
298	+3. 22·7	−6. 19·5	118. 11·3	343	+6. 51·4	−2. 5·4	163. 7·6
299	+3. 29·3	−6. 15·9	119. 11·5	344	+6. 53·5	−1. 58·2	164. 7·2
300	+3. 35·8	−6. 12·2	120. 11·7	345	+6. 55·5	−1. 51·0	165. 6·8
301	+3. 42·3	−6. 8·3	121. 11·9	346	+6. 57·4	−1. 43·8	166. 6·4
302	+3. 48·7	−6. 4·4	122. 12·2	347	+6. 59·1	−1. 36·5	167. 5·9
303	+3. 55·1	−6. 0·3	123. 12·4	348	+7. 0·7	−1. 29·2	168. 5·5
304	+4. 1·3	−5. 56·1	124. 12·6	349	+7. 2·2	−1. 21·8	169. 5·1
305	+4. 7·5	−5. 51·9	125. 12·7	350	+7. 3·6	−1. 14·5	170. 4·7
306	+4. 13·6	−5. 47·6	126. 12·9	351	+7. 4·8	−1. 7·1	171. 4·2
307	+4. 19·6	−5. 43·1	127. 13·0	352	+7. 5·9	−0. 59·7	172. 3·8
308	+4. 25·6	−5. 38·5	128. 13·1	353	+7. 6·8	−0. 52·3	173. 3·3
309	+4. 31·5	−5. 33·8	129. 13·2	354	+7. 7·7	−0. 44·9	174. 2·8
310	+4. 37·2	−5. 29·1	130. 13·3	355	+7. 8·4	−0. 37·4	175. 2·3
311	+4. 42·9	−5. 24·2	131. 13·4	356	+7. 9·0	−0. 29·9	176. 1·9
312	+4. 48·5	−5. 19·2	132. 13·4	357	+7. 9·4	−0. 22·4	177. 1·4
313	+4. 54·1	−5. 14·1	133. 13·5	358	+7. 9·7	−0. 15·0	178. 1·0
314	+4. 59·5	−5. 8·9	134. 13·5	359	+7. 9·9	−0. 7·5	179. 0·5
315	+5. 4·9	−5. 3·7	135. 13·5	360	+7. 10·0	0. 0·0	180. 0·0

TABLE IV.

Epochs of coincidence of prime meridian with the Ascending Node of the Sun's Equator, taking 25·38 mean Solar days as a working period.

1853.	1855.	1856.	1857.	1858.	1860.
d.	d.	d.	d.	d.	d.
288·86	15·70	107·54	198·38	290·22	17·06
314·24	41·08	132·92	223·76	315·60	42·44
339·62	66·46	158·30	249·14	340·98	67·82
1854.	91·84	183·68	274·52	1859.	93·20
0·00	117·22	209·06	299·90	1·36	118·58
25·38	142·60	234·44	325·28	26·74	143·96
50·76	167·98	259·82	350·66	52·12	169·34
76·14	193·36	285·20	1858.	77·50	194·72
101·52	218·74	310·58	11·04	102·88	220·10
126·90	244·12	335·96	36·42	128·26	245·48
152·28	269·50	361·34	61·80	153·64	270·86
177·66	294·88	1857.	87·18	179·02	296·24
203·04	320·26	20·72	112·56	204·40	321·62
228·42	345·64	46·10	137·94	229·78	347·00
253·80	1856.	71·48	163·32	255·16	1861.
279·18	6·02	96·86	188·70	280·54	6·38
304·56	31·40	122·24	214·08	305·92	31·76
329·94	56·78	147·62	239·46	331·30	57·14
355·32	82·16	173·00	264·84	356·68	82·52

TABLE V.

Angles to subtract from computed Longitude to refer the Solar spots to assumed prime meridian.

1853.	Less Epoch	Subtract	1854.	Less Epoch	Subtract
d.	d.	° ′	d.	d.	° ′
312·489	23·629	335. 10	7·535	7·535	106. 53
320·453	6·213	88. 7	12·496	12·496	177. 15
324·488	10·248	145. 22	18·506	18·506	262. 30
·497	·257	. 29	20·576	20·576	291. 52
326·472	12·232	172. 56	32·567	7·187	101. 57
328·552	14·312	203. 0	34·508	9·128	129. 28
334·498	20·258	287. 21	40·460	15·080	213. 54
335·484	21·244	301. 20	42·496	17·116	242. 47
341·599	1·979	28. 4	43·573	18·193	258. 3
342·491	2·871	40. 43	44·485	19·105	271. 0
345·567	5·947	84. 21	46·516	21·136	299. 49
347·492	7·872	111. 39	48·549	23·169	328. 38
349·507	9·887	140. 14	51·496	0·736	10. 26
352·558	12·938	183. 31	59·509	8·749	124. 6
359·487	19·867	281. 49	67·574	16·814	238. 30
361·481	21·861	310. 5			
362·541	22·921	325. 7			
364·517	24·897	353. 9	The above is a sufficient specimen of this Table.		

SECTION II.

DEDUCED POSITIONS OF THE NUCLEI OBSERVED.

The dates are in all cases inserted on which the Sun was found to be free of Spots. In the years 1855 and 1856 the blanks in the record from this cause are very numerous. The contents of the different columns are explained in the Introduction.

1853.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Nov. 9	312·489	0001	·8971	108. 41	269. 1	293. 51	+ 5. 12	1
17	320·453	2	·6970	294. 56	24. 44	296. 37	+ 4. 38	1
		3	·1601	33. 5	338. 43	250. 36	+11. 20	2
21	324·488	4	·8609	303. 36	43. 31	258. 9	+13. 6	2
		5	·7678	306. 1	33. 50	248. 28	+13. 50	2
	·497	6	·8498	301. 13	42. 29	257. 0	+10. 58	2
		7	·7844	302. 59	35. 43	250. 14	+11. 44	2
23	326·472	8	·6793	118. 39	304. 41	131. 45	− 5. 25	3
		9	·7501	116. 28	298. 43	125. 47	− 4. 37	3
25	328·552	0010	·2341	136. 20	336. 57	133. 57	− 4. 58	3
		1	·4335	79. 40	325. 54	122. 54	+13. 8	4
Dec. 1	334·498	2	·3234	261. 10	11. 58	84. 37	− 7. 7	5
		3	·2304	249. 33	5. 33	78. 12	− 7. 10	5
2	335·484	4	·5351	272. 8	27. 17	85. 57	− 6. 37	5
		5	·4287	268. 15	20. 3	78. 43	− 6. 47	5
		6	·9645	120. 8	282. 0	340. 40	−13. 57	6
8	341·599	7	·2806	236. 19	13. 17	345. 13	−11. 58	6
		8	·2327	206. 43	5. 13	337. 9	−13. 15	6
		9	·3173	152. 52	349. 52	321. 48	−14. 13	6
		0020	·9746	92. 59	285. 24	257. 20	+ 9. 39	7
9	342·491	1	·4340	254. 16	25. 47	345. 4	−12. 10	6
		2	·2689	263. 14	17. 34	336. 51	− 9. 26	6
		3	·8936	89. 36	300. 28	259. 45	+11. 22	7
		4	·9059	91. 42	298. 38	257. 55	+ 9. 39	7
		5	·9354	90. 22	294. 20	253. 37	+11. 15	7
12	345·567	6	·4213	70. 31	344. 22	260. 1	+11. 40	7
		7	·5027	76. 31	338. 20	253. 59	+11. 25	7
14	347·492	8	·2227	351. 40	12. 5	260. 26	+11. 8	7
		9	·1929	0. 6	9. 55	258. 16	+ 9. 54	7
		0030	·3334	138. 27	352. 23	240. 44	−12. 46	8
		1	·5976	80. 56	333. 5	221. 26	+10. 36	9

1854.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Dec. 16	349·507	0032	·5108	301. 29	38. 34	258. 20	+ 9. 55	7
		3	·2211	17. 12	8. 13	227. 59	+11. 21	9
		4	·2560	43. 23	1. 38	221. 24	+10. 58	9
19	352·558	5	·8767	291. 34	73. 4	249. 33	+11. 1	7
		6	·6727	297. 39	53. 12	229. 41	+11. 47	9
		7	·5609	301. 15	44. 37	221. 6	+11. 21	9
		8	·5872	295. 40	47. 23	223. 52	+ 8. 53	9
26	359·487	9	·2576	13. 39	17. 43	95. 54	+12. 12	11
28	361·481	0040	·4736	304. 1	46. 37	96. 32	+11. 18	11
		1	·5668	267. 38	56. 25	106. 20	− 5. 40	10
		2	·5198	266. 12	53. 10	103. 5	− 6. 13	10
		3	·2456	293. 15	35. 25	85. 20	+ 2. 3	12
29	362·541	4	·7636	269. 9	72. 48	107. 41	− 4. 55	10
		5	·6847	266. 31	66. 10	101. 3	− 6. 38	10
		6	·6500	294. 59	61. 3	95. 56	+11. 40	11
		7	·8046	103. 50	329. 54	4. 47	−10. 13	13
31	364·517	8	·9285	265. 40	93. 19	100. 10	− 7. 15	10
		9	·3990	110. 41	2. 40	9. 31	−10. 3	13
1854.		0050	·7580	105. 39	336. 25	343. 16	−12. 7	14
Jan. 8	7·535	1	·9000	257. 2	97. 27	350. 34	−11. 53	14
		2	·5644	69. 46	0. 50	253. 57	+ 7. 0	15
		3	·6469	73. 16	354. 31	247. 38	+ 6. 35	15
13	12·496	4	·5890	282. 47	72. 44	255. 29	+ 6. 6	15
		5	·5132	289. 49	66. 30	249. 15	+ 8. 0	15
19	18·506	6	·3455	73. 2	24. 39	122. 9	− 1. 16	16
		7	·3457	75. 8	24. 31	122. 1	− 1. 59	16
		8	·4244	94. 50	19. 39	117. 9	− 9. 28	17
		9	·4404	95. 2	18. 38	116. 8	− 9. 42	17
21	20·576	0060	·1565	287. 4	54. 41	122. 49	− 1. 25	16
22	. . .	1	. .	. . .	. . .	. . .	. . .	. .
23	. . .	2	. .	. . .	. . .	. . .	. . .	. .
25	. . .	3	. .	. . .	. . .	. . .	. . .	. .
26	. . .	4	. .	. . .	. . .	. . .	. . .	. .
28	. . .	5	. .	. . .	. . .	. . .	. . .	. .
Feb. 2	32·567	6	·3431	46. 6	41. 42	299. 45	+ 4. 16	19
		7	·4420	51. 58	35. 11	293. 14	+ 5. 9	19
		8	·9631	81. 58	344. 8	242. 11	− 6. 20	20
4	34·508	9	·7816	276. 47	108. 57	339. 29	+11. 41	18
		0070	·2377	308. 39	69. 5	299. 37	+ 4. 36	19
		1	·2166	316. 34	66. 54	297. 26	+ 4. 34	19
		2	·1897	330. 2	63. 47	294. 19	+ 4. 12	19
		3	·2060	336. 28	62. 46	293. 18	+ 5. 24	19
		4	·7387	76. 31	13. 9	243. 41	− 4. 23	20
		5	·7656	78. 40	10. 42	241. 14	− 5. 50	20
10	40·460	6	·6399	261. 14	106. 3	252. 9	− 0. 32	20
		7	·5828	262. 28	101. 51	247. 57	− 0. 32	20
		8	·4974	252. 32	96. 41	242. 47	− 6. 29	20
		9	·5140	264. 10	97. 4	243. 10	− 0. 32	20
		0080	·3760	93. 53	45. 34	191. 40	−13. 27	21
		1	·4466	95. 4	41. 19	187. 25	−15. 8	21
12	42·496	2	·9189	255. 23	135. 19	252. 32	− 0. 48	20
		3	·8168	257. 47	123. 10	240. 23	− 0. 17	20
		4	·1693	207. 52	75. 50	193. 3	−13. 32	21

1854.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Feb. 12		0085	·5510	74. 22	35. 22	152. 35	− 6. 9	22
		6	·5891	76. 48	32. 39	149. 52	− 7. 26	22
13	43·573	7	·9435	254. 44	140. 17	242. 14	− 0. 37	20
		8	·3022	72. 45	52. 20	154. 17	− 6. 22	22
		9	·3524	70. 24	49. 20	151. 17	− 5. 24	22
		0090	·3794	75. 49	47. 36	149. 33	− 7. 19	22
14	44·485	1	·0821	63. 46	66. 14	155. 14	− 6. 2	22
		2	·1351	61. 15	63. 17	152. 17	− 5. 12	22
		3	·1813	78. 20	60. 26	149. 26	− 7. 41	22
		4	·2621	71. 35	55. 40	144. 40	− 6. 15	22
		5	·3025	74. 36	53. 14	142. 14	− 7. 3	22
16	46·516	6	·4026	253. 5	96. 42	156. 53	− 5. 50	22
		7	·3846	255. 38	95. 30	155. 41	− 4. 56	22
		8	·3309	254. 19	92. 15	152. 26	− 5. 42	22
		9	·2845	249. 2	89. 31	149. 42	− 7. 24	22
		0100	·2757	244. 35	88. 55	149. 6	− 8. 37	22
		1	·2740	249. 54	88. 58	149. 9	− 7. 10	22
		2	·2629	243. 22	88. 8	148. 19	− 8. 52	22
18	48·549	3	·8058	247. 35	128. 55	160. 17	− 7. 7	22
		4	·6722	246. 25	117. 26	148. 48	− 8. 25	22
21	51·496	5	·2236	85. 5	65. 22	54. 56	−10. 4	23
		6	·2512	82. 41	63. 38	53. 12	− 9. 50	23
23	. . .	7	. .	. . .	. . .	. . .	. . .	. .
25	. . .	8	. .	. . .	. . .	. . .	. . .	. .
26	. . .	9	. .	. . .	. . .	. . .	. . .	. .
27	. . .	0110	. .	. . .	. . .	. . .	. . .	. .
28	. . .	1	. .	. . .	. . .	. . .	. . .	. .
Mar. 1	59·509	2	·9264	262. 8	151. 48	27. 42	+ 9. 59	24
		3	·9126	263. 56	149. 27	25. 21	+11. 9	24
4	. . .	4	. .	. . .	. . .	. . .	. . .	. .
5	. . .	5	. .	. . .	. . .	. . .	. . .	. .
6	. . .	6	. .	. . .	. . .	. . .	. . .	. .
9	67·574	7	·3782	22. 13	78. 24	199. 54	+ 8. 21	25
		8	·3725	27. 20	77. 23	198. 53	+ 6. 41	25
11	69·500	9	·3306	291. 57	109. 31	203. 42	+ 6. 45	25
		0120	·3048	313. 43	102. 53	197. 4	+ 9. 13	25
		1	·5788	69. 10	60. 40	154. 51	− 7. 36	26
		2	·6377	67. 58	56. 26	150. 37	− 6. 42	26
		3	·6823	67. 27	53. 2	147. 13	− 6. 10	26
12	70·518	4	·5132	271. 9	124. 54	204. 39	+ 6. 20	25
		5	·4329	284. 46	117. 3	196. 48	+ 9. 2	25
		6	·4361	66. 2	71. 17	151. 2	− 6. 28	26
13	71·532	7	·6823	262. 34	139. 5	204. 27	+ 6. 3	25
		8	·5990	272. 2	131. 3	196. 25	+ 9. 26	25
		9	·0276	80. 47	96. 41	162. 3	− 7. 30	26
	·538	0130	·6004	271. 40	131. 14	196. 31	+ 9. 16	25
		1	·2081	63. 49	86. 12	151. 29	− 6. 33	26
17	75·481	2	·4443	312. 32	112. 24	121. 45	+17. 14	27
		3	·3967	312. 16	111. 16	120. 37	+14. 26	27
		4	·4003	318. 7	109. 6	118. 27	+15. 27	27
		5	·4001	333. 14	102. 56	112. 17	+16. 27	27
		6	·9491	56. 34	31. 47	41. 8	+ 5. 45	29
		7	·9855	54. 5	23. 37	32. 58	+ 9. 30	29

1854.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Mar. 21	79·596	0138	·9451	266. 10	173. 24	124. 23	+17. 48	27
		9	·8568	268. 46	160. 43	111. 42	+16. 37	27
		0140	·3407	23. 54	91. 17	42. 16	+ 6. 7	29
		1	·4735	30. 36	82. 58	33. 57	+ 8. 57	29
22	80·514	2	·3318	9. 53	96. 1	33. 58	+ 8. 54	29
26	84·569	3	·8343	240. 54	167. 57	48. 24	− 6. 19	28
		4	·7946	239. 45	164. 4	44. 31	− 7. 28	28
		5	·7120	263. 18	153. 54	34. 21	+ 8. 39	29
27	85·510	6	·8999	239. 1	176. 36	43. 41	− 7. 21	28
		7	·8333	258. 28	166. 34	33. 39	+ 8. 11	29
28	. . .	8	. .	. . .	. . .	. . .	. . .	. .
31	89·556	9	·9849	57. 43	37. 5	206. 47	+ 4. 44	31
April 1	90·587	0150	·9187	55. 36	51. 33	206. 38	+ 4. 49	31
		1	·9666	51. 52	43. 46	198. 51	+ 9. 39	31
2	91·560	2	·8125	53. 25	65. 4	206. 21	+ 4. 30	31
		3	·8922	50. 0	57. 0	198. 17	+ 9. 8	31
5	94·550	4	·3011	27. 28	107. 5	205. 57	+ 4. 13	31
		5	·4501	29. 15	99. 8	198. 0	+ 8. 58	31
		6	·7851	35. 3	74. 55	173. 47	+17. 47	32
6	95·570	7	·1818	337. 56	121. 21	205. 45	+ 4. 19	31
		8	·2976	4. 7	113. 23	197. 47	+ 8. 47	31
		9	·6588	26. 39	88. 37	173. 1	+18. 13	32
		0160	·6278	72. 53	83. 14	167. 38	−10. 33	33
8	97·508	1	·4529	264. 39	149. 0	205. 55	+ 3. 56	31
		2	·4365	353. 2	115. 18	172. 13	+18. 20	32
		3	·8264	35. 55	73. 36	130. 31	+18. 48	34
	·519	4	·7695	268. 6	170. 12	226. 57	+14. 29	30
		5	·3877	295. 33	138. 8	194. 53	+11. 56	31
		6	·3566	301. 6	135. 17	192. 2	+11. 36	31
		7	·3656	294. 22	137. 37	194. 22	+10. 36	31
		8	·3863	284. 54	141. 5	197. 50	+ 9. 2	31
		9	·3470	299. 15	135. 30	192. 15	+10. 45	31
		0170	·4523	264. 25	149. 1	205. 46	+ 3. 49	31
21	110·555	1	·2939	219. 47	152. 35	24. 26	−11. 44	35
		2	·6108	43. 43	101. 41	333. 32	+ 8. 24	36
24	113·459	3	·8109	233. 36	193. 47	24. 26	−11. 44	35
		4	·2298	319. 55	143. 2	333. 41	+ 8. 8	36
29	118·540	5	·8431	47. 52	89. 26	208. 1	+12. 24	37
May 2	121·566	6	·3682	16. 19	133. 27	209. 7	+12. 29	37
		7	·3780	19. 9	132. 15	207. 55	+12. 13	37
		8	·8634	41. 5	91. 44	167. 24	+19. 10	38
4	123·536	9	·3052	296. 44	160. 45	208. 28	+ 9. 56	37
		0180	·6063	27. 31	119. 34	167. 17	+19. 8	38
9	128·551	1	·6536	283. 6	188. 28	165. 3	+19. 41	38
		2	·2064	346. 40	152. 20	128. 55	+ 8. 35	39
		3	·2465	5. 41	147. 29	124. 4	+ 9. 23	39
		4	·7465	50. 27	107. 54	84. 29	+10. 28	40
		5	·7934	51. 46	103. 30	80. 5	+10. 26	40
		6	·7640	53. 35	105. 51	82. 26	+ 8. 30	40
10	129·562	7	·2412	309. 42	161. 47	124. 1	+ 9. 14	39
		8	·5833	45. 11	122. 9	84. 23	+10. 22	40
		9	·6478	47. 33	117. 10	79. 24	+10. 31	40
		0190	·9404	76. 20	85. 7	47. 21	− 9. 5	41

1854.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
May 12	131·524	0191	·2389	3. 42	151. 8	85. 33	+ 9. 37	40
		2	·3052	20. 22	145. 8	79. 33	+10. 17	40
		3	·6848	78. 6	114. 13	48. 38	− 8. 46	41
		4	·7610	81. 59	108. 8	42. 33	−12. 13	41
14	133·543	5	·4185	279. 26	180. 22	86. 8	+ 9. 52	40
		6	·3283	290. 11	173. 26	79. 12	+ 9. 59	40
		7	·3043	88. 7	142. 14	48. 0	− 8. 13	41
		8	·3883	88. 58	137. 23	43. 9	−10. 4	41
16	135·526	9	·7526	262. 44	208. 28	86. 7	+ 8. 25	40
		0200	·1907	219. 19	170. 28	48. 7	− 7. 47	41
		1	·1761	173. 52	163. 30	41. 9	−12. 7	41
17	136·542	2	·3657	225. 38	181. 40	44. 54	−10. 37	41
		3	·3297	224. 55	179. 31	42. 45	−10. 2	41
		4	·3211	216. 33	177. 47	41. 1	−12. 12	41
20	139·505	5	·8247	236. 57	219. 37	40. 49	−12. 14	41
	·520	6	·8345	236. 56	220. 39	41. 39	−12. 21	41
23	142·538	7	·9277	234. 54	234. 59	13. 10	−15. 56	42
		8	·8906	233. 20	229. 31	7. 42	−16. 49	42
24	. . .	9	. .	. . .	. . .	. . .	. . .	. .
26	. . .	0210	. .	. . .	. . .	. . .	. . .	. .
28	147·555	1	·2262	288. 2	183. 7	250. 8	+ 6. 27	43
30	. . .	2	. .	. . .	. . .	. . .	. . .	. .
31	150·520	3	·2126	333. 56	177. 27	202. 24	+11. 25	44
		4	·2240	354. 56	172. 48	197. 45	+12. 4	44
June 1	151·505	5	·3538	289. 18	193. 20	204. 20	+11. 6	44
		6	·2848	307. 11	186. 20	197. 20	+12. 32	44
4	154·551	7	·8712	269. 8	238. 43	206. 30	+11. 29	44
		8	·7783	272. 24	228. 44	196. 31	+12. 43	44
		9	·3258	40. 35	163. 24	131. 11	+10. 40	45
		0220	·6117	60. 7	142. 33	110. 20	+ 9. 24	46
10	160·547	1	·3487	278. 23	203. 55	86. 39	+ 7. 26	47
13	163·598	2	·7522	79. 38	139. 2	338. 30	+ 0. 33	48
14	. . .	3	. . .	. . .	. . .	. . .	. . .	. .
17	167·555	4	·4341	65. 25	166. 32	309. 52	+ 8. 3	49
22	172·590	5	·8139	71. 38	142. 10	214. 5	+10. 45	50
		6	·9268	99. 59	129. 48	201. 43	−14. 28	51
23	173·517	7	·6714	70. 39	155. 34	214. 20	+10. 23	50
		8	·8289	103. 17	143. 18	202. 4	−14. 43	51
24	174·531	9	·4919	67. 17	169. 33	213. 56	+10. 13	50
		0230	·6921	108. 43	157. 26	201. 49	−14. 52	51
25	175·542	1	·2911	55. 22	184. 4	214. 6	+10. 26	50
		2	·5355	118. 1	171. 27	201. 29	−14. 56	51
	·545	3	·7412	104. 26	153. 26	183. 26	−12. 46	51
26	176·509	4	·1436	9. 48	197. 46	214. 6	+10. 24	50
		5	·3826	135. 24	185. 15	201. 35	−14. 39	51
27	177·520	6	·2407	300. 30	212. 21	214. 20	+10. 22	50
		7	·2983	171. 10	199. 26	201. 25	−14. 40	51
		8	·3744	128. 7	184. 28	186. 27	−12. 7	51
28	178·510	9	·4366	284. 40	226. 32	214. 29	+10. 22	50
		0240	·3585	208. 16	213. 6	201. 3	−14. 59	51
	·559	1	·4461	283. 56	227. 15	214. 30	+10. 13	50
		2	·3609	209. 44	213. 40	200. 55	−14. 48	51
29	179·536	3	·6385	279. 10	241. 50	215. 13	+10. 8	50

1854.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
June 29	. . .	0244	·5001	230. 49	228. 23	201. 46	−14. 25	51
30	180·542	5	·7959	277. 31	256. 6	215. 13	+10. 4	50
		6	·6605	241. 6	241. 21	200. 28	−14. 27	51
	·572	7	·8012	277. 59	256. 37	215. 20	+10. 28	50
		8	·6621	241. 57	241. 43	200. 26	−13. 59	51
July 2	182·563	9	·9105	251. 22	269. 17	199. 45	−13. 41	51
4	184·512	0250	·2820	220. 28	218. 22	121. 11	− 8. 54	52
16	. . .	1	. .	. . .	. . .	. . .	. . .	. .
17	. . .	2	. .	. . .	. . .	. . .	. . .	. .
18	198·567	3	·8834	77. 44	158. 54	222. 21	+17. 35	55
19	199·522	4	·3008	258. 15	238. 20	288. 14	− 0. 32	54
		5	·6998	74. 43	178. 29	228. 23	+17. 55	55
		6	·7775	76. 56	171. 21	221. 15	+17. 27	55
20	200·563	7	·4925	67. 42	195. 45	230. 54	+17. 50	55
		8	·5463	71. 27	191. 30	226. 39	+17. 17	55
		9	·6101	74. 47	186. 37	221. 46	+17. 17	55
21	201·560	0260	·3084	50. 42	210. 41	231. 41	+17. 33	55
		1	·3973	64. 58	203. 4	224. 4	+16. 35	55
	·565	2	·3063	50. 46	210. 46	231. 41	+17. 27	55
		3	·3669	59. 24	205. 53	226. 48	+17. 27	55
22	202·520	4	·2271	5. 21	224. 57	232. 19	+18. 7	55
		5	·2367	28. 30	219. 22	226. 44	+17. 41	55
		6	·7545	83. 9	175. 50	183. 12	+13. 39	56
23	203·516	7	·3078	324. 21	238. 13	231. 28	+17. 58	55
		8	·2534	336. 40	233. 17	226. 32	+17. 37	55
		9	·5886	80. 46	190. 10	183. 25	+13. 49	56
24	204·499	0270	·4754	306. 25	252. 21	231. 39	+17. 50	55
		1	·3958	311. 59	246. 28	225. 46	+17. 43	55
25	205·515	2	·6406	299. 17	266. 4	230. 58	+17. 27	55
		3	·5627	301. 19	260. 6	225. 0	+17. 12	55
27	207·615	4	·9152	295. 55	295. 58	231. 4	+17. 36	55
29	209·565	5	·9318	114. 45	164. 42	72. 9	−11. 40	57
		6	·9557	111. 5	159. 55	67. 22	− 8. 58	57
30	210·518	7	·8314	118. 12	178. 37	72. 33	−11. 30	57
		8	·8787	113. 54	172. 35	66. 31	− 9. 7	57
Aug. 1	212·496	9	·5303	133. 17	207. 2	72. 54	−11. 12	57
		0280	·5887	125. 56	201. 30	67. 22	− 9. 25	57
2	213·549	1	·3702	152. 34	221. 30	72. 26	−10. 57	57
	·558	2	·3699	153. 50	221. 54	72. 43	−11. 14	57
		3	·4146	141. 44	216. 30	67. 19	− 9. 54	57
6	217·587	4	·6855	259. 47	278. 46	72. 26	−10. 56	57
		5	·6256	258. 41	274. 14	67. 54	− 9. 53	57
7	218·517	6	·8171	265. 31	292. 3	72. 31	−10. 42	57
8	219·525	7	·9189	269. 29	305. 34	71. 44	−10. 26	57
		8	·9784	98. 23	162. 30	288. 40	+ 6. 32	58
10	221·504	9	·7872	101. 8	190. 43	288. 49	+ 6. 33	58
11	222·537	0290	·6164	102. 40	205. 39	289. 6	+ 6. 25	58
13	224·503	1	·2072	107. 7	233. 43	289. 17	+ 6. 4	58
	·547	2	·1962	107. 31	234. 24	289. 20	+ 6. 2	58
14	225·494	3	·0222	265. 46	247. 51	289. 21	+ 6. 9	58
16	227·574	4	·4784	286. 27	277. 16	289. 16	+ 5. 48	58
18	229·612	5	·8240	289. 41	306. 15	289. 20	+ 5. 50	58
19	230·470	6	·9188	290. 58	318. 25	289. 20	+ 5. 50	58

1854.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Aug. 20	231·502	0297	·9846	292. 33	333. 44	290. 1	+ 5. 49	58
22	. . .	8	. .	. . .	. . .	. . .	. . .	. .
24	. . .	9	. .	. . .	. . .	. . .	. . .	. .
25	236·508	0300	·9399	123. 2	189. 24	74. 41	−10. 14	59
26	237·535	1	·8445	126. 44	203. 23	74. 5	−10. 20	59
27	238·564	2	·7022	132. 9	218. 10	74. 17	−10. 3	59
		3	·6796	104. 37	216. 18	72. 25	+ 8. 48	60
		4	·7029	106. 32	214. 29	70. 36	+ 7. 26	60
28	239·528	5	·5481	141. 24	231. 56	74. 22	−10. 13	59
		6	·4894	107. 13	230. 51	73. 17	+ 7. 38	60
		7	·5313	107. 28	228. 3	70. 29	+ 7. 27	60
29	240·526	8	·3912	159. 58	246. 19	74. 36	−10. 23	59
		9	·3290	109. 17	241. 58	70. 15	+ 7. 5	60
30	241·522	0310	·3031	195. 9	260. 29	74. 38	−10. 23	59
31	242·546	1	·3611	235. 23	275. 6	74. 44	−10. 19	59
Sept. 1	243·517	2	·5033	256. 34	288. 54	74. 45	−10. 8	59
		3	·8302	108. 51	207. 52	353. 43	+ 6. 0	61
4	246·525	4	·2870	115. 8	250. 25	353. 37	+ 5. 58	61
		5	·9786	107. 44	188. 40	291. 52	+ 5. 39	63
6	248·519	6	·7686	107. 3	218. 31	293. 26	+ 8. 45	63
		7	·7957	110. 31	216. 11	291. 6	+ 5. 54	63
7	249·513	8	·5919	108. 25	233. 33	294. 22	+ 8. 18	63
		9	·6392	111. 43	230. 11	291. 0	+ 6. 8	63
8	250·563	0320	·3821	109. 3	248. 30	294. 25	+ 8. 6	63
		1	·4614	116. 50	243. 40	289. 35	+ 4. 34	63
		2	·7380	130. 25	225. 57	271. 52	− 7. 45	64
10	252·531	3	·0131	244. 43	273. 28	291. 28	+ 6. 36	63
		4	·3881	156. 33	256. 26	274. 26	− 8. 30	64
		5	·4517	146. 7	250. 33	268. 33	− 7. 30	64
	·540	6	·0707	303. 23	276. 59	294. 51	+ 7. 51	63
		7	·3897	156. 52	256. 27	274. 19	− 8. 39	64
		8	·4810	147. 11	249. 14	267. 6	− 8. 56	64
11	253·505	9	·6247	300. 6	312. 47	316. 58	+ 9. 41	62
		0330	·5927	295. 38	310. 24	314. 35	+ 7. 1	62
		1	·2579	294. 16	288. 55	293. 6	+ 7. 6	63
		2	·2039	291. 47	285. 43	289. 54	+ 6. 39	63
		3	·2791	192. 34	270. 52	275. 3	− 8. 41	64
		4	·3010	170. 18	264. 24	268. 35	− 7. 28	64
		5	·3485	167. 4	261. 52	266. 3	− 9. 13	64
12	254·505	6	·8044	300. 2	328. 48	318. 48	+ 9. 19	62
		7	·7636	296. 35	324. 53	314. 53	+ 6. 48	62
		8	·3257	236. 30	285. 9	275. 9	− 8. 48	64
		9	·2605	217. 29	278. 29	268. 29	− 7. 28	64
	·516	0340	·8045	299. 47	328. 49	318. 40	+ 9. 6	62
		1	·4761	295. 39	303. 27	293. 18	+ 7. 12	63
		2	·3240	237. 4	285. 15	275. 6	− 8. 37	64
		3	·2795	210. 14	276. 45	266. 36	− 8. 55	64
15	257·479	4	·9116	298. 7	343. 50	291. 39	+ 6. 26	63
		5	·7844	277. 23	327. 1	274. 50	− 8. 32	64
		6	·7136	274. 23	320. 26	268. 15	− 8. 48	64
21	. . .	7	. .	. . .	. . .	. . .	. . .	. .
22	. . .	8	. .	. . .	. . .	. . .	. . .	. .
25	267·483	9	·7706	130. 54	239. 22	45. 17	− 7. 11	65

1854.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Sept. 25	. . .	0350	·8100	127. 42	235. 9	41. 4	− 5. 37	65
26	268·544	1	·6457	133. 5	250. 37	41. 29	− 5. 45	65
		2	·9419	106. 30	217. 45	8. 37	+10. 57	66
27	269·538	3	·8449	107. 44	231. 41	8. 27	+10. 26	66
28	270·559	4	·6990	107. 52	246. 12	8. 29	+10. 24	66
		5	·9913	108. 42	207. 43	330. 0	+ 8. 0	67
29	271·554	6	·5191	107. 14	260. 26	8. 36	+10. 13	66
		7	·9323	110. 17	222. 33	330. 43	+ 7. 43	67
30	272·562	8	·3117	103. 18	274. 48	8. 40	+10. 14	66
		9	·8233	110. 58	237. 2	330. 54	+ 7. 56	67
Oct. 1	273·524	0360	·1097	80. 38	288. 29	8. 43	+10. 11	66
		1	·6725	112. 10	251. 15	331. 29	+ 7. 31	67
		2	·2731	79. 58	280. 29	0. 43	+15. 38	66
2	274·512	3	·1557	322. 59	302. 44	8. 57	+10. 28	66
		4	·4825	112. 19	265. 43	331. 56	+ 7. 34	67
		5	·1645	24. 23	294. 57	1. 10	+15. 56	66
19	. . .	6	. .	. . .	. . .	. . .	. . .	. .
20	. . .	7	. .	. . .	. . .	. . .	. . .	. .
21	. . .	8	. .	. . .	. . .	. . .	. . .	. .
22	. . .	9	. .	. . .	. . .	. . .	. . .	. .
24	296·472	0370	·4048	146. 16	296. 0	50. 43	− 7. 13	68
25	. . .	1	. .	. . .	. . .	. . .	. . .	. .
31	303·476	2	·8221	108. 10	268. 9	283. 31	+ 7. 48	69
Nov. 1	304·512	3	·6651	107. 29	282. 54	283. 35	+ 7. 47	69
3	306·492	4	·2711	98. 17	311. 16	283. 52	+ 8. 4	69
6	309·520	5	·4331	306. 16	354. 41	284. 20	+ 8. 45	69
9	312·478	6	·9033	301. 25	37. 0	284. 40	+ 9. 6	69
11	314·553	7	·8593	98. 30	275. 42	133. 57	+13. 30	70
		8	·9260	98. 26	266. 54	125. 9	+14. 5	70
15	318·533	9	·2144	48. 3	332. 52	134. 40	+13. 37	70
		0380	·3288	74. 50	322. 48	124. 36	+13. 46	70
22	325·488	1	·8133	274. 1	38. 25	101. 34	−11. 12	71
		2	·7206	272. 52	29. 59	93. 8	−10. 23	71
23	326·462	3	·9211	275. 18	52. 24	101. 44	−11. 47	71
		4	·8498	275. 40	43. 29	92. 49	−10. 16	71
		5	·4853	133. 58	320. 4	9. 24	−10. 19	72
		6	·6138	126. 45	310. 19	359. 39	− 9. 27	72
		7	·8136	92. 29	293. 4	342. 24	+14. 15	73
27	330·494	8	·4949	264. 10	17. 55	10. 4	−10. 12	72
		9	·3704	255. 14	9. 1	1. 10	−10. 13	72
		0390	·2237	16. 2	350. 52	343. 1	+14. 3	73
29	332·505	1	·8475	272. 48	49. 20	12. 57	−11. 14	72
		2	·7923	273. 4	43. 49	7. 26	−10. 10	72
		3	·7235	272. 28	37. 42	1. 19	− 9. 34	72
		4	·6013	307. 57	27. 35	351. 12	+13. 17	73
		5	·4989	313. 37	19. 43	343. 20	+13. 49	73
		6	·3606	320. 48	10. 18	333. 55	+12. 29	73
30	333·485	7	·9502	274. 54	64. 39	14. 22	−10. 36	72
		8	·8590	274. 56	51. 54	1. 37	− 9. 21	72
		9	·7959	300. 1	45. 23	355. 6	+11. 18	73
		0400	·6680	305. 59	33. 42	343. 25	+13. 32	73
Dec. 4	. . .	1	. .	. . .	. . .	. . .	. . .	. .
6	. . .	2	. .	. . .	. . .	. . .	. . .	. .

1854.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Dec. 12	345·530	0403	·3247	52. 20	353. 6	131. 58	+13. 26	74
		4	·6163	121. 0	329. 22	108. 14	−12. 30	75
		5	·7412	121. 40	319. 45	98. 37	−15. 22	75
		6	·7215	116. 37	320. 38	99. 30	−11. 26	75
16	349·515	7	·6723	300. 58	49. 33	131. 53	+13. 14	74
		8	·3305	248. 26	26. 23	108. 43	−10. 57	75
		9	·2744	212. 22	16. 2	98. 22	−15. 47	75
27	. . .	0410	. .	. . .	. . .	. . .	. . .	. .
28	. . .	1	. .	. . .	. . .	. . .	. . .	. .
Jan. 3	. . .	2	. .	. . .	. . .	. . .	. . .	. .
1855. 5	. . .	3	. .	. . .	. . .	. . .	. . .	. .
10	9·515	4	·8497	254. 10	93. 3	180. 47	−13. 29	76
		5	·8184	253. 7	89. 39	177. 23	−14. 7	76
		6	·3203	338. 55	41. 3	128. 47	+13. 29	77
11	10·519	7	·5509	293. 18	66. 5	139. 34	+10. 24	77
		8	·5087	294. 34	63. 11	136. 40	+ 9. 47	77
		9	·9407	93. 15	325. 48	39. 17	− 7. 17	79
13	12·508	0420	·7270	93. 26	351. 30	36. 47	− 8. 22	79
		1	·8056	94. 43	344. 26	29. 43	− 9. 34	79
14	13·552	2	·7209	259. 42	85. 16	115. 44	− 7. 23	78
		3	·6763	260. 41	81. 41	112. 9	− 6. 39	78
		4	·5441	92. 58	6. 18	36. 46	− 7. 48	79
		5	·6341	95. 18	359. 59	30. 27	− 9. 39	79
17	16·570	6	·1294	243. 19	49. 12	36. 52	− 7. 25	79
		7	·0767	187. 15	43. 13	30. 53	− 9. 5	79
18	17·493	8	·3320	255. 36	62. 25	36. 59	− 7. 20	79
		9	·2398	245. 5	56. 24	30. 58	− 9. 10	79
		0430	·9740	74. 11	327. 26	302. 0	+ 8. 7	80
21	20·567	1	·8622	256. 34	105. 59	36. 57	− 7. 36	79
		2	·6107	61. 40	11. 11	302. 9	+ 8. 10	80
23	22·607	3	·2591	20. 45	41. 2	303. 4	+ 7. 40	80
		4	·2833	81. 19	31. 55	293. 57	− 5. 7	81
27	. . .	5	. .	. . .	. . .	. . .	. . .	. .
29	. . .	6	. .	. . .	. . .	. . .	. . .	. .
30	. . .	7	. .	. . .	. . .	. . .	. . .	. .
Feb. 10	40·552	8	·5658	79. 6	32. 4	39. 33	− 8. 14	82
12	42·490	9	·0784	69. 17	64. 6	44. 6	− 6. 20	82
		0440	·1617	82. 18	59. 21	39. 21	− 8. 1	82
14	44·542	1	·2997	247. 14	88. 8	39. 2	− 8. 6	82
15	45·512	2	·5003	247. 44	101. 47	38. 55	− 8. 13	82
16	46·466	3	·7191	247. 33	118. 49	42. 25	− 8. 0	82
		4	·6738	246. 57	115. 11	38. 47	− 8. 30	82
		5	·6777	251. 9	115. 22	38. 58	− 5. 40	82
17	47·550	6	·8469	249. 1	131. 46	40. 0	− 6. 2	82
		7	·8357	246. 7	130. 44	38. 58	− 8. 32	82
18	48·524	8	·9344	244. 58	144. 18	38. 43	− 8. 29	82
20	. . .	9	. .	. . .	. . .	. . .	. . .	. .
21	. . .	0450	. .	. . .	. . .	. . .	. . .	. .
24	54·508	1	·9272	60. 6	14. 10	183. 42	+ 6. 2	83
Mar. 1	59·565	2	·4588	26. 34	65. 35	163. 23	+11. 0	84
		3	·3654	23. 22	70. 49	168. 37	+ 7. 59	84
3	61·552	4	·3270	322. 21	92. 58	162. 35	+11. 9	84
		5	·3352	299. 46	99. 54	169. 31	+ 8. 14	84

1855.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Mar. 4	62·587	0456	·4425	291. 45	107. 44	162. 40	+11. 7	84
		7	·5165	276. 45	115. 56	170. 52	+ 8. 10	84
		8	·8442	78. 59	30. 53	85. 49	−13. 28	85
5	63·528	9	·5850	274. 50	121. 32	163. 7	+ 9. 29	84
		0460	·6130	270. 27	124. 29	166. 4	+ 7. 57	84
		1	·7105	79. 4	44. 27	86. 2	−13. 17	85
6	64·519	2	·7418	267. 31	135. 36	163. 8	+ 9. 54	84
		3	·7978	262. 52	141. 32	169. 4	+ 7. 59	84
		4	·5436	80. 21	58. 8	85. 40	−13. 11	85
		5	·5929	81. 12	54. 42	82. 14	−14. 5	85
		6	·9791	74. 59	11. 58	39. 30	− 9. 9	86
7	65·490	7	·8649	262. 49	149. 15	163. 1	+ 9. 53	84
		8	·9239	258. 55	157. 34	171. 20	+ 8. 11	84
		9	·3554	84. 6	71. 37	85. 23	−12. 44	85
		0470	·9117	73. 33	25. 40	39. 26	− 9. 0	86
12	70·531	1	·0392	160. 17	97. 7	39. 22	− 9. 21	86
13	71·528	2	·2330	235. 9	111. 19	39. 26	− 9. 21	86
16	74·500	3	·7973	239. 12	154. 7	40. 4	− 9. 4	86
19	. . .	4	. .	. . .	. . .	. . .	. . .	. .
20	. . .	5	. .	. . .	. . .	. . .	. . .	. .
26	84·465	6	·5882	42. 30	77. 36	182. 13	+ 6. 52	87
27	85·610	7	·3927	28. 4	93. 25	181. 48	+ 6. 58	87
29		8	. .	. . .	. . .	. . .	. . .	. .
30	88·664	9	·3529	308. 38	123. 51	168. 54	+12. 7	88
	. . .	1480	·3369	316. 40	120. 52	165. 55	+12. 14	88
31	. . .	1	. .	. . .	. . .	. . .	. . .	. .
April 2	91·535	2	·6363	245. 42	157. 19	161. 39	− 3. 37	89
		3	·7666	266. 1	164. 18	168. 38	+12. 34	88
4	. . .	4	. .	. . .	. . .	. . .	. . .	. .
5	94·534	5	·9065	75. 46	55. 21	17. 8	−13. 36	90
8	. . .	6	. .	. . .	. . .	. . .	. . .	. .
10	. . .	7	. .	. . .	. . .	. . .	. . .	. .
11	. . .	8	. .	. . .	. . .	. . .	. . .	. .
12	. . .	9	. .	. . .	. . .	. . .	. . .	. .
14	. . .	0490	. .	. . .	. . .	. . .	. . .	. .
15	. . .	1	. .	. . .	. . .	. . .	. . .	. .
16	. . .	2	. .	. . .	. . .	. . .	. . .	. .
17	. . .	3	. .	. . .	. . .	. . .	. . .	. .
18	. . .	4	. .	. . .	. . .	. . .	. . .	. .
19	108·622	5	·6804	263. 35	175. 3	297. 0	+ 9. 9	91
20	109·512	6	·8114	259. 13	187. 53	297. 13	+ 9. 0	91
21	. . .	7	. .	. . .	. . .	. . .	. . .	. .
22	. . .	8	. .	. . .	. . .	. . .	. . .	. .
23	. . .	9	. .	. . .	. . .	. . .	. . .	. .
24	. . .	0500	. .	. . .	. . .	. . .	. . .	. .
26	115·506	1	·7765	70. 12	90. 26	114. 45	− 6. 53	92
27	116·650	2	·5703	70. 29	107. 47	115. 52	− 6. 38	92
28	117·507	3	·3183	74. 14	124. 57	120. 53	− 6. 54	92
		4	·3848	72. 9	120. 49	116. 45	− 6. 35	92
30	. . .	5	. .	. . .	. . .	. . .	. . .	. .
May 2	121·514	6	·2193	353. 16	143. 27	82. 32	+ 8. 9	93
		7	·2632	8. 34	139. 0	78. 5	+ 8. 54	93
		8	·8643	52. 15	89. 0	28. 5	+ 9. 46	95

1855.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
May 3	122·504	0509	·2646	291. 59	158. 49	83. 52	+ 7. 9	93
		0510	·2453	320. 5	152. 6	77. 9	+ 9. 47	93
		1	·2168	10. 11	141. 11	66. 14	+ 6. 32	94
		2	·7338	49. 42	102. 51	27. 54	+ 9. 18	95
5	124·506	3	·6449	261. 2	188. 52	85. 31	+ 6. 27	93
		4	·6402	263. 52	188. 3	84. 42	+ 8. 7	93
	·515	5	·5590	271. 43	180. 57	77. 29	+10. 37	93
	...	6	·3738	279. 27	168. 30	65. 2	+ 8. 15	94
	...	7	·3433	287. 30	165. 17	61. 49	+ 9. 29	94
8	...	8	..	...	...	...	...	..
9	...	9	..	...	...	...	...	..
12	...	0520	..	...	...	...	...	..
20	139·531	1	·7671	255. 49	214. 11	257. 43	+ 2. 51	96
24	...	2	..	...	...	...	...	..
25	...	3	..	...	...	...	...	..
26	...	4	..	...	...	...	...	..
27	...	5	..	...	...	...	...	..
29	...	6	..	...	...	...	...	..
30	...	7	..	...	...	...	...	..
June 2	...	8	..	...	...	...	...	..
4	...	9	..	...	...	...	...	..
5	...	0530	..	...	...	...	...	..
6	...	1	..	...	...	...	...	..
7	...	2	..	...	...	...	...	..
9	159·578	3	·5727	69. 24	149. 2	268. 13	+ 5. 7	97
		4	·6416	71. 46	143. 57	263. 8	+ 4. 10	97
10	160·544	5	·3627	65. 5	163. 48	269. 17	+ 5. 12	97
		6	·4280	74. 59	159. 17	264. 46	+ 1. 51	97
11	161·517	7	·1395	45. 45	178. 41	270. 21	+ 4. 59	97
		8	·1752	65. 39	175. 36	267. 16	+ 2. 54	97
		9	·2197	69. 48	172. 55	264. 35	+ 2. 34	97
14	164·575	0540	·5542	266. 40	221. 40	269. 58	+ 4. 38	97
		1	·4858	268. 20	217. 1	265. 19	+ 5. 1	97
16	166·568	2	·8713	264. 53	250. 35	270. 37	+ 4. 17	97
		3	·8169	266. 0	244. 43	264. 45	+ 5. 4	97
17	...	4	..	...	...	...	...	..
19	...	5	..	...	...	...	...	..
20	...	6	..	...	...	...	...	..
21	...	7	..	...	...	...	...	..
22	...	8	..	...	...	...	...	..
24	...	9	..	...	...	...	...	..
25	...	0550	..	...	...	...	...	..
26	...	1	..	...	...	...	...	..
27	...	2	..	...	...	...	...	..
28	...	3	..	...	...	...	...	..
29	...	4	..	...	...	...	...	..
30	...	5	..	...	...	...	...	..
July 1	...	6	..	...	...	...	...	..
2	...	7	..	...	...	...	...	..
3	...	8	..	...	...	...	...	..
4	...	9	..	...	...	...	...	..
5	...	0560	..	...	...	...	...	..
6	...	1	..	...	...	...	...	..

1855.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
July 7	...	0562	..	...	...	...	...	..
8	...	3	..	...	...	...	...	..
10	...	4	..	...	...	...	...	..
12	...	5	..	...	...	...	...	..
13	...	6	..	...	...	...	...	..
14	...	7	..	...	...	...	...	..
15	...	8	..	...	...	...	...	..
16	...	9	..	...	...	...	...	..
18	...	0570	..	...	...	...	...	..
20	...	1	..	...	...	...	...	..
21	...	2	..	...	...	...	...	..
23	...	3	..	...	...	...	...	..
24	204·684	4	·6135	114. 23	190. 20	29. 43	− 5. 54	98
25	...	5	..	...	...	...	...	..
27	...	6	..	...	...	...	...	..
29	...	7	..	...	...	...	...	..
30	...	8	..	...	...	...	...	..
Aug. 1	...	9	..	...	...	...	...	..
2	...	0580	..	...	...	...	...	..
3	...	1	..	...	...	...	...	..
4	215·587	2	·0381	254. 29	238. 47	283. 30	+ 5. 0	99
		3	·0364	138. 54	235. 11	279. 54	+ 4. 46	99
5	216·534	4	·2711	281. 19	253. 29	284. 46	+ 5. 31	99
		5	·1988	274. 9	249. 5	280. 22	+ 4. 18	99
6	217·645	6	·5175	284. 26	270. 2	285. 34	+ 6. 2	99
		7	·4318	281. 8	264. 23	279. 55	+ 4. 46	99
7	218·549	8	·6945	285. 38	283. 46	286. 28	+ 6. 5	99
		9	·6054	283. 13	276. 57	279. 39	+ 4. 54	99
8	219·584	0590	·8447	287. 24	298. 30	286. 32	+ 6. 30	99
		1	·7719	285. 12	291. 16	279. 18	+ 5. 10	99
9	220·559	2	·9426	288. 45	312. 23	286. 34	+ 6. 34	99
10	...	3	..	...	...	...	...	..
11	...	4	..	...	...	...	...	..
12	...	5	..	...	...	...	...	..
13	224·536	6	·3508	100. 3	224. 55	142. 42	+ 8. 0	100
15	...	7	..	...	...	...	...	..
16	...	8	..	...	...	...	...	..
17	...	9	..	...	...	...	...	..
18	...	0600	..	...	...	...	...	..
19	...	1	..	...	...	...	...	..
21	...	2	..	...	...	...	...	..
22	...	3	..	...	...	...	...	..
23	...	4	..	...	...	...	...	..
24	...	5	..	...	...	...	...	..
25	...	6	..	...	...	...	...	..
26	...	7	..	...	...	...	...	..
27	...	8	..	...	...	...	...	..
28	...	9	..	...	...	...	...	..
29	...	0610	..	...	...	...	...	..
30	...	1	..	...	...	...	...	..
31	...	2	..	...	...	...	...	..
Sept. 1	...	3	..	...	...	...	...	..
3	...	4	..	...	...	...	...	..

1855.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Sept. 4	. . .	0615	. .	. . .	. . .	. . .	. . .	. .
5	. . .	6	. .	. . .	. . .	. . .	. . .	. .
6	. . .	7	. .	. . .	. . .	. . .	. . .	. .
9	. . .	8	. .	. . .	. . .	. . .	. . .	. .
11	. . .	9	. .	. . .	. . .	. . .	. . .	. .
12	. . .	0620	. .	. . .	. . .	. . .	. . .	. .
13	. . .	1	. .	. . .	. . .	. . .	. . .	. .
16	. . .	2	. .	. . .	. . .	. . .	. . .	. .
19	261·483	3	·2219	325. 20	292. 48	46. 31	+13. 20	101
20	. . .	4	. .	. . .	. . .	. . .	. . .	. .
21	. . .	5	. .	. . .	. . .	. . .	. . .	. .
23	. . .	6	. .	. . .	. . .	. . .	. . .	. .
24	. . .	7	. .	. . .	. . .	. . .	. . .	. .
25	. . .	8	. .	. . .	. . .	. . .	. . .	. .
26	. . .	9	. .	. . .	. . .	. . .	. . .	. .
Oct. 1	. . .	0630	. .	. . .	. . .	. . .	. . .	. .
2	274·516	1	·3984	258. 43	312. 55	241. 46	− 7. 46	102
		2	·3635	256. 5	310. 36	239. 27	− 7. 13	102
4	276·492	3	·7692	280. 1	344. 23	245. 12	− 8. 8	102
		4	·6984	276. 5	337. 46	238. 35	− 9. 6	102
		5	·3244	187. 44	290. 20	191. 9	−11. 26	103
8	. . .	6	. .	. . .	. . .	. . .	. . .	. .
9	. . .	7	. .	. . .	. . .	. . .	. . .	. .
10	. . .	8	. .	. . .	. . .	. . .	. . .	. .
13	285·491	9	·3981	147. 42	285. 22	58. 33	− 6. 23	104
		0640	·4567	141. 46	280. 53	54. 4	− 5. 55	104
14	. . .	1	. .	. . .	. . .	. . .	. . .	. .
15	. . .	2	. .	. . .	. . .	. . .	. . .	. .
16	. . .	3	. .	. . .	. . .	. . .	. . .	. .
17	289·542	4	·3526	240. 46	321. 1	36. 44	−11. 22	105
		5	·3299	234. 44	318. 30	34. 13	−11. 18	105
18	290·495	6	·5051	262. 49	335. 37	37. 49	−11. 7	105
20	292·573	7	·8301	278. 46	6. 1	38. 44	−11. 6	105
		8	·7860	276. 32	1. 18	34. 1	−11. 42	105
		9	·0236	349. 7	313. 8	345. 51	+ 6. 23	105
	·596	0650	·8305	278. 22	5. 59	38. 23	−11. 26	105
		1	·7892	276. 28	1. 36	34. 0	−11. 50	105
		2	·0177	319. 7	313. 17	345. 41	+ 5. 42	106
24	296·563	3	·8049	109. 23	262. 37	238. 45	+ 8. 0	107
27	299·541	4	·2366	103. 20	305. 50	239. 43	+ 7. 22	107
28	300·539	5	·0432	27. 33	320. 9	239. 53	+ 7. 4	107
Nov. 1	304·506	6	·7956	300. 10	16. 55	240. 23	+ 7. 0	107
4	. . .	7	. .	. . .	. . .	. . .	. . .	. .
5	. . .	8	. .	. . .	. . .	. . .	. . .	. .
6	. . .	9	. .	. . .	. . .	. . .	. . .	. .
9	. . .	0660	. .	. . .	. . .	. . .	. . .	. .
14	. . .	1	. .	. . .	. . .	. . .	. . .	. .
15	. . .	2	. .	. . .	. . .	. . .	. . .	. .
16	. . .	3	. .	. . .	. . .	. . .	. . .	. .
22	. . .	4	. .	. . .	. . .	. . .	. . .	. .
23	. . .	5	. .	. . .	. . .	. . .	. . .	. .
26	. . .	6	. .	. . .	. . .	. . .	. . .	. .
27	. . .	7	. .	. . .	. . .	. . .	. . .	. .

1855.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Nov. 30	333·487	0668	·3888	292. 27	15. 58	188. 21	+ 3. 6	108
		9	·3295	295. 21	12. 14	184. 37	+ 3. 42	108
Dec. 2	335·527	0670	·7894	287. 54	47. 15	190. 42	+ 2. 8	108
		1	·7114	290. 10	40. 26	183. 53	+ 3. 37	108
3	336·490	2	·8999	285. 48	60. 12	189. 59	+ 0. 40	108
		3	·8506	289. 5	54. 19	184. 6	+ 3. 29	108
5	...	4	..	...	...	...	...	..
6	...	5	..	...	...	...	...	..
7	...	6	..	...	...	...	...	..
8	...	7	..	...	...	...	...	..
11	...	8	..	...	...	...	...	..
12	...	9	..	...	...	...	...	..
13	...	0680	..	...	...	...	...	..
16	...	1	..	...	...	...	...	..
18	...	2	..	...	...	...	...	..
19	...	3	..	...	...	...	...	..
20	353·510	4	·6120	264. 17	50. 26	298. 48	− 9. 32	109
		5	·5696	260. 59	47. 4	295. 26	−10. 51	109
		6	·2493	48. 36	4. 2	252. 24	+ 9. 10	110
21	...	7	..	...	...	...	...	..
22	...	8	..	...	...	...	...	..
24	...	9	..	...	...	...	...	..
25	...	0690	..	...	...	...	...	..
27	...	1	..	...	...	...	...	..
28	...	2	..	...	...	...	...	..
29	...	3	..	...	...	...	...	..
30	...	4	..	...	...	...	...	..
31	...	5	..	...	...	...	...	..
Jan. 2	...	6	..	...	...	...	...	..
1856. 6	...	7	..	...	...	...	...	..
7	...	8	..	...	...	...	...	..
10	...	9	..	...	...	...	...	..
12	...	0700	..	...	...	...	...	..
13	...	1	..	...	...	...	...	..
14	...	2	..	...	...	...	...	..
15	...	3	..	...	...	...	...	..
23	...	4	..	...	...	...	...	..
25	...	5	..	...	...	...	...	..
27	...	6	..	...	...	...	...	..
28	...	7	..	...	...	...	...	..
29	...	8	..	...	...	...	...	..
Feb. 3	...	9	..	...	...	...	...	..
5	...	0710	..	...	...	...	...	..
9	39·526	1	·8123	270. 30	117. 22	2. 6	+ 8. 51	111
		2	·7735	272. 18	113. 25	358. 9	+ 9. 15	111
14	...	3	..	...	...	...	...	..
16	...	4	..	...	...	...	...	..
23	53·557	5	·9245	263. 25	145. 5	190. 48	+ 9. 32	112
		6	·8788	265. 54	138. 33	184. 16	+10. 22	112
24	...	7	..	...	...	...	...	..
26	...	8	..	...	...	...	...	..
29	...	9	..	...	...	...	...	..
Mar. 5	...	0720	..	...	...	...	...	..

1856.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	′ °	
Mar. 8	. . .	0721	. .	. . .	. . .	. . .	. . .	. .
10	. . .	2	. .	. . .	. . .	. . .	. . .	. .
12	. . .	3	. .	. . .	. . .	. . .	. . .	. .
13	. . .	4	. .	. . .	. . .	. . .	. . .	. .
16	. . .	5	. .	. . .	. . .	. . .	. . .	. .
19	. . .	6	. .	. . .	. . .	. . .	. . .	. .
20	. . .	7	. .	. . .	. . .	. . .	. . .	. .
22	. . .	8	. .	. . .	. . .	. . .	. . .	. .
23	. . .	9	. .	. . .	. . .	. . .	. . .	. .
24	. . .	0730	. .	. . .	. . .	. . .	. . .	. .
27	. . .	1	. .	. . .	. . .	. . .	. . .	. .
28	. . .	2	. .	. . .	. . .	. . .	. . .	. .
29	. . .	3	. .	. . .	. . .	. . .	. . .	. .
30	. . .	4	. .	. . .	. . .	. . .	. . .	. .
31	. . .	5	. .	. . .	. . .	. . .	. . .	. .
April 1	. . .	6	. .	. . .	. . .	. . .	. . .	. .
2	. . .	7	. .	. . .	. . .	. . .	. . .	. .
4	. . .	8	. .	. . .	. . .	. . .	. . .	. .
5	. . .	9	. .	. . .	. . .	. . .	. . .	. .
7	. . .	0740	. .	. . .	. . .	. . .	. . .	. .
10	100·572	1	·8843	73. 29	64. 5	162. 55	−11. 21	113
		2	·9403	71. 39	56. 5	154. 55	− 9. 27	113
16	106·458	3	·3036	219. 11	148. 39	164. 0	−12. 23	113
		4	·2829	215. 25	147. 2	162. 23	−12. 53	113
17	107·507	5	·5100	228. 36	163. 26	163. 54	−12. 19	113
18	108·509	6	·6910	231. 23	177. 48	164. 3	−12. 30	113
19	109·640	7	·8500	232. 53	193. 44	163. 57	−12. 19	113
		8	·5546	46. 29	103. 32	73. 45	+ 5. 26	114
20	110·532	9	·9374	233. 2	206. 14	163. 48	−12. 19	113
		0750	·3514	34. 57	118. 29	76. 3	+ 5. 10	114
		1	·4252	36. 59	114. 4	71. 38	+ 6. 38	114
21	111·522	2	·1832	351. 54	134. 7	77. 38	+ 5. 9	114
23	. . .	3	. .	. . .	. . .	. . .	. . .	. .
24	. . .	4	. .	. . .	. . .	. . .	. . .	. .
25	. . .	5	. .	. . .	. . .	. . .	. . .	. .
26	. . .	6	. .	. . .	. . .	. . .	. . .	. .
28	. . .	7	. .	. . .	. . .	. . .	. . .	. .
30	. . .	8	. .	. . .	. . .	. . .	. . .	. .
May 2	. . .	9	. .	. . .	. . .	. . .	. . .	. .
3	. . .	0760	. .	. . .	. . .	. . .	. . .	. .
4	. . .	1	. .	. . .	. . .	. . .	. . .	. .
5	. . .	2	. .	. . .	. . .	. . .	. . .	. .
10	. . .	3	. .	. . .	. . .	. . .	. . .	. .
11	. . .	4	. .	. . .	. . .	. . .	. . .	. .
13	. . .	5	. .	. . .	. . .	. . .	. . .	. .
14	. . .	6	. .	. . .	. . .	. . .	. . .	. .
15	. . .	7	. .	. . .	. . .	. . .	. . .	. .
16	. . .	8	. .	. . .	. . .	. . .	. . .	. .
17	. . .	9	. .	. . .	. . .	. . .	. . .	. .
18	. . .	0770	. .	. . .	. . .	. . .	. . .	. .
19	. . .	1	. .	. . .	. . .	. . .	. . .	. .
20	. . .	2	. .	. . .	. . .	. . .	. . .	. .
21	. . .	3	. .	. . .	. . .	. . .	. . .	. .

1856.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
May 25	. . .	0774	. .	. . .	. . .	. . .	. . .	. .
26	. . .	5	. .	. . .	. . .	. . .	. . .	. .
27	. . .	6	. .	. . .	. . .	. . .	. . .	. .
28	148·631	7	·0929	287. 0.	177. 21	314. 30	+ 2. 3	115
29	. . .	8	. .	. . .	. . .	. . .	. . .	. .
30	. . .	9	. .	. . .	. . .	. . .	. . .	. .
June 1	. . .	0780	. .	. . .	. . .	. . .	. . .	. .
2	153·518	1	·5768	197. 16	198. 3	265. 53	−29. 26	116
		2	·5790	184. 57	191. 1	258. 51	−33. 11	116
3	154·514	3	·6643	205. 53	208. 18	262. 0	−30. 31	116
		4	·6606	198. 3	203. 42	257. 24	−33. 55	116
		5	·2758	299. 12	190. 12	243. 54	+10. 44	117
		6	·2381	307. 8	187. 9	240. 51	+10. 30	117
4	155·513	7	·7799	217. 31	223. 34	263. 6	−29. 0	116
		8	·4830	279. 38	206. 10	245. 42	+11. 3	117
		9	·4049	282. 30	200. 59	240. 31	+10. 18	117
6	157·505	0790	·9608	227. 12	252. 38	263. 55	−28. 15	116
		1	·8234	270. 13	235. 51	247. 8	+11. 4	117
		2	·7483	270. 32	228. 48	240. 5	+10. 19	117
9	160·549	3	·8216	265. 22	239. 6	207. 12	+ 6. 18	118
		4	·7876	265. 30	235. 48	203. 54	+ 6. 11	118
10	161·508	5	·9230	264. 47	252. 13	206. 43	+ 6. 6	118
		6	·3501	303. 32	199. 55	154. 25	+14. 55	119
		7	·3141	304. 53	197. 59	152. 29	+13. 44	119
11	. . .	8	. .	. . .	. . .	. . .	. . .	. .
15	. . .	9	. .	. . .	. . .	. . .	. . .	. .
16	. . .	0800	. .	. . .	. . .	. . .	. . .	. .
20	. . .	1	. .	. . .	. . .	. . .	. . .	. .
21	. . .	2	. .	. . .	. . .	. . .	. . .	. .
24	. . .	3	. .	. . .	. . .	. . .	. . .	. .
25	. . .	4	. .	. . .	. . .	. . .	. . .	. .
26	. . .	5	. .	. . .	. . .	. . .	. . .	. .
27	. . .	6	. .	. . .	. . .	. . .	. . .	. .
28	. . .	7	. .	. . .	. . .	. . .	. . .	. .
29	. . .	8	. .	. . .	. . .	. . .	. . .	. .
30	. . .	9	. .	. . .	. . .	. . .	. . .	. .
July 1	. . .	0810	. .	. . .	. . .	. . .	. . .	. .
2	. . .	1	. .	. . .	. . .	. . .	. . .	. .
3	184·517	2	·4221	116. 18	184. 52	173. 0	− 8. 14	120
4	. . .	3	. .	. . .	. . .	. . .	. . .	. .
5	. . .	4	. .	. . .	. . .	. . .	. . .	. .
6	. . .	5	. .	. . .	. . .	. . .	. . .	. .
9	. . .	6	. .	. . .	. . .	. . .	. . .	. .
10	. . .	7	. .	. . .	. . .	. . .	. . .	. .
15	. . .	8	. .	. . .	. . .	. . .	. . .	. .
16	. . .	9	. .	. . .	. . .	. . .	. . .	. .
17	. . .	0820	. .	. . .	. . .	. . .	. . .	. .
19	. . .	1	. .	. . .	. . .	. . .	. . .	. .
21	. . .	2	. .	. . .	. . .	. . .	. . .	. .
22	203·535	3	·9772	90. 49	147. 3	225. 26	+ 7. 15	121
23	204·500	4	·9098	92. 7	160. 20	225. 1	+ 7. 5	121
24	205·572	5	·7792	93. 11	175. 44	225. 13	+ 7. 2	121
25	206·470	6	·6391	93. 42	188. 6	224. 50	+ 7. 5	121

1856.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
July 26	207·510	0827	·4368	93. 24	202. 59	224. 58	+ 7. 13	121
28	209·593	8	·0445	323. 4	232. 43	225. 9	+ 7. 19	121
29	210·478	9	·2406	286. 55	245. 35	225. 28	+ 7. 7	121
30	211·501	0830	·4576	283. 53	259. 56	225. 19	+ 6. 39	121
31	212·509	1	·6430	283. 24	273. 43	224. 48	+ 6. 4	121
Aug. 1	. . .	2	. .	. . .	. . .	. . .	. . .	. .
2	. . .	3	. .	. . .	. . .	. . .	. . .	. .
3	215·535	4	·5615	51. 28	212. 3	120. 12	+31. 4	122
4	. . .	5	. .	. . .	. . .	. . .	. . .	. .
5	. . .	6	. .	. . .	. . .	. . .	. . .	. .
6	. . .	7	. .	. . .	. . .	. . .	. . .	. .
7	. . .	8	. .	. . .	. . .	. . .	. . .	. .
9	. . .	9	. .	. . .	. . .	. . .	. . .	. .
10	. . .	0840	. .	. . .	. . .	. . .	. . .	. .
11	. . .	1	. .	. . .	. . .	. . .	. . .	. .
12	. . .	2	. .	. . .	. . .	. . .	. . .	. .
13	. . .	3	. .	. . .	. . .	. . .	. . .	. .
14	. . .	4	. .	. . .	. . .	. . .	. . .	. .
15	. . .	5	. .	. . .	. . .	. . .	. . .	. .
16	228·505	6	·9555	117. 20	177. 46	261. 57	− 8. 1	123
17	229·599	7	·8473	120. 44	194. 8	262. 48	− 7. 46	123
21	233·565	8	·2592	185. 38	250. 40	263. 5	− 7. 42	123
22	234·507	9	·2962	231. 21	264. 7	263. 10	− 7. 32	123
23	235·512	0850	·4518	257. 1	278. 30	263. 18	− 7. 22	123
26	238·513	1	·9050	278. 9	321. 54	264. 8	− 7. 24	123
		2	·7979	273. 25	309. 18	251. 32	− 8. 33	123
27	239·554	3	·9714	281. 14	334. 42	262. 10	− 6. 50	123
		4	·9078	278. 35	323. 18	250. 46	− 7. 20	123
28	. . .	5	. .	. . .	. . .	. . .	. . .	. .
30	242·521	6	·8989	144. 0	206. 16	91. 38	−25. 33	124
31	243·503	7	·8005	150. 55	220. 46	92. 13	−25. 35	124
		8	·8594	146. 29	212. 55	84. 22	−25. 21	124
Sept. 1	244·580	9	·6864	159. 36	234. 35	90. 45	−24. 32	124
		0860	·7525	154. 34	227. 26	83. 36	−25. 16	124
2	245·513	1	·5893	174. 57	248. 42	91. 38	−24. 49	124
		2	·6197	168. 47	243. 58	86. 54	−24. 38	124
3	246·512	3	·5414	196. 21	263. 16	92. 2	−25. 19	124
		4	·5435	187. 15	257. 55	86. 41	−24. 31	124
4	247·502	5	·5565	217. 49	277. 4	91. 47	−25. 12	124
		6	·5300	209. 1	271. 32	86. 15	−24. 28	124
5	248·514	7	·6364	235. 53	291. 20	91. 43	−25. 21	124
		8	·5859	229. 24	285. 29	85. 52	−24. 30	124
6	249·542	9	·7457	248. 15	305. 40	91. 27	−25. 36	124
		0870	·6930	246. 14	300. 58	86. 45	−23. 56	124
7	250·515	1	·7974	255. 11	314. 3	86. 2	−23. 57	124
8	. . .	2	. .	. . .	. . .	. . .	. . .	. .
11	254·520	3	·6154	67. 23	244. 13	319. 24	+32. 31	125
		4	·6379	70. 10	241. 28	316. 39	+32. 0	125
13	256·612	5	·4220	30. 14	273. 24	318. 54	+31. 48	125
		6	·4348	37. 3	269. 51	315. 21	+32. 1	125
14	257·506	7	·4351	7. 32	285. 43	318. 33	+31. 34	125
		8	·4291	15. 16	281. 49	314. 39	+32. 3	125
15	. . .	9	. .	. . .	. . .	. . .	. . .	. .

1856.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Sept. 16	. . .	0880	. .	. . .	. . .	. . .	. . .	. .
18	261·563	1	·5692	197. 20	276. 35	251. 52	−27. 12	126
19	262·482	2	·5703	215. 39	289. 3	251. 17	−26. 59	126
		3	·5844	211. 1	286. 15	248. 29	−28. 23	126
20	. . .	4	. .	. . .	. . .	. . .	. . .	. .
21	. . .	5	. .	. . .	. . .	. . .	. . .	. .
23	. . .	6	. .	. . .	. . .	. . .	. . .	. .
25	. . .	7	. .	. . .	. . .	. . .	. . .	. .
26	. . .	8	. .	. . .	. . .	. . .	. . .	. .
29	. . .	9	. .	. . .	. . .	. . .	. . .	. .
30	. . .	0890	. .	. . .	. . .	. . .	. . .	. .
Oct. 1	. . .	1	. .	. . .	. . .	. . .	. . .	. .
2	. . .	2	. .	. . .	. . .	. . .	. . .	. .
7	. . .	3	. .	. . .	. . .	. . .	. . .	. .
20	. . .	4	. .	. . .	. . .	. . .	. . .	. .
21	. . .	5	. .	. . .	. . .	. . .	. . .	. .
26	. . .	6	. .	. . .	. . .	. . .	. . .	. .
27	300·465	7	·5285	189. 39	310. 54	94. 23	−25. 54	127
		8	·5338	184. 43	309. 47	93. 16	−21. 29	127
29	302·542	9	·9625	144. 50	252. 31	6. 32	−27. 11	128
30	303·570	0900	·8710	149. 58	269. 50	9. 1	−27. 32	128
Nov. 1	305·535	1	·6646	166. 39	297. 40	9. 14	−27. 55	128
3	307·542	2	·5296	200. 27	324. 51	7. 56	−27. 51	128
4	308·511	3	·5488	220. 24	338. 6	7. 27	−27. 51	128
5	. . .	4	. .	. . .	. . .	. . .	. . .	. .
6	. . .	5	. .	. . .	. . .	. . .	. . .	. .
9	. . .	6	. .	. . .	. . .	. . .	. . .	. .
10	. . .	7	. .	. . .	. . .	. . .	. . .	. .
11	. . .	8	. .	. . .	. . .	. . .	. . .	. .
12	. . .	9	. .	. . .	. . .	. . .	. . .	. .
13	. . .	0910	. .	. . .	. . .	. . .	. . .	. .
14	. . .	1	. .	. . .	. . .	. . .	. . .	. .
15	319·509	2	·6209	178. 25	322. 32	195. 53	−32. 18	129
		3	·6664	175. 30	318. 35	191. 56	−34. 20	129
16	320·506	4	·5753	195. 35	336. 22	195. 34	−32. 20	129
		5	·6166	188. 37	330. 51	190. 3	−34. 27	129
18	322·533	6	·6484	234. 10	6. 42	197. 10	−30. 26	129
		7	·6483	222. 57	359. 34	190. 2	−34. 29	129
19	323·511	8	·7162	234. 29	12. 15	188. 50	−34. 13	129
23	. . .	9	. .	. . .	. . .	. . .	. . .	. .
24	328·531	0920	·9156	257. 2	49. 51	155. 13	−27. 40	130
25	329·487	1	·9628	259. 14	60. 18	152. 7	−27. 8	130
26	330·549	2	·9734	144. 10	277. 32	354. 17	−35. 0	132
27	331·500	3	·4346	215. 35	359. 32	62. 48	−23. 9	131
		4	·9187	147. 12	291. 18	354. 34	−35. 25	132
29	333·504	5	·7387	160. 7	320. 31	355. 21	−35. 36	132
30	334·485	6	·6627	170. 22	333. 17	354. 12	−35. 47	132
Dec. 1	335·493	7	·6074	184. 59	347. 1	353. 38	−35. 51	132
2	. . .	8	. .	. . .	. . .	. . .	. . .	. .
4	. . .	9	. .	. . .	. . .	. . .	. . .	. .
7	. . .	0930	. .	. . .	. . .	. . .	. . .	. .
11	. . .	1	. .	. . .	. . .	. . .	. . .	. .
12	. . .	2	. .	. . .	. . .	. . .	. . .	. .

1856.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Dec. 14	. . .	0933	. .	. . .	. . .	. . .	. . .	. .
15	. . .	4	. .	. . .	. . .	. . .	. . .	. .
16	. . .	5	. .	. . .	. . .	. . .	. . .	. .
19	353·499	6	·6662	133. 39	337. 1	88. 14	−24. 6	133
		7	·7901	130. 29	325. 59	77. 12	−26. 13	133
23	357·545	8	·4496	215. 36	31. 26	85. 16	−24. 59	133
		9	·3996	210. 3	27. 30	81. 20	−23. 25	133
		0940	·4173	203. 21	25. 12	79. 2	−25. 29	133
24	358·513	1	·6020	233. 43	47. 59	88. 5	−25. 32	133
		2	·5071	229. 56	40. 55	81. 1	−23. 14	133
		3	·4697	215. 13	33. 15	73. 21	−26. 9	133
26	360·468	4	·8101	245. 39	71. 18	83. 41	−24. 35	133
		5	·7744	245. 59	67. 53	80. 16	−23. 23	133
27	361·503	6	·9202	248. 48	86. 54	84. 35	−24. 11	133
		7	·8901	249. 31	82. 37	80. 18	−22. 56	133
28	362·500	8	·9586	250. 12	95. 13	78. 46	−23. 10	133
29	. . .	9	. .	. . .	. . .	. . .	. . .	. .
Jan. 1	0·478	0950	·7140	121. 36	344. 14	271. 21	−23. 12	134
1857. 2	1·492	1	·5358	128. 35	0. 13	272. 57	−21. 53	134
		2	·6212	127. 48	354. 20	267. 4	−24. 28	134
3	2·501	3	·3810	149. 2	16. 1	274. 27	−22. 11	134
		4	·4983	139. 42	7. 21	265. 47	−25. 13	134
5	4·538	5	·3957	215. 20	44. 51	274. 23	−22. 15	134
10	9·560	6	·9736	245. 16	112. 46	271. 4	−22. 20	134
		7	·6254	335. 3	51. 34	209. 52	+31. 13	135
		8	·5966	343. 43	44. 57	203. 15	+31. 10	135
12	11·456	9	·7986	310. 31	79. 1	210. 25	+30. 29	135
		0960	·7340	319. 6	68. 56	200. 20	+31. 55	135
		1	·9306	53. 25	335. 7	106. 31	+28. 22	136
14	13·503	2	·9585	299. 2	107. 2	209. 24	+30. 23	135
		3	·9077	303. 25	96. 23	198. 45	+31. 30	135
		4	·7542	40. 26	2. 20	104. 42	+28. 28	136
		5	·8113	44. 2	355. 35	97. 57	+29. 3	136
		6	·9739	80. 31	323. 21	65. 43	+ 3. 38	137
		7	·8809	46. 44	346. 42	89. 4	+30. 36	136
16	15·507	8	·7593	75. 16	353. 8	67. 5	+ 3. 46	137
17	16·594	9	·5759	69. 12	8. 56	67. 28	+ 4. 21	137
19	18·591	0970	·2106	28. 27	37. 46	67. 58	+ 4. 49	137
		1	·2088	32. 39	37. 8	67. 20	+ 4. 12	137
21	20·502	2	·3622	291. 0	65. 12	68. 17	+ 5. 4	137
		3	·3449	290. 24	64. 22	67. 27	+ 4. 22	137
23	22·538	4	·9236	110. 47	341. 56	316. 9	−29. 18	138
24	23·649	5	·8139	112. 36	358. 1	316. 28	−28. 50	138
28	27·481	6	·4076	161. 52	50. 28	314. 34	−29. 32	138
29	28·476	7	·4301	187. 32	64. 1	314. 0	−29. 42	138
30	. . .	8	. .	. . .	. . .	. . .	. . .	. .
31	. . .	9	. .	. . .	. . .	. . .	. . .	. .
Feb. 1	. . .	0980	. .	. . .	. . .	. . .	. . .	. .
4	34·468	1	·9204	107. 42	354. 24	159. 24	−31. 18	139
		2	·9602	112. 2	346. 46	151. 46	−35. 4	139
6	36·492	3	·7038	114. 52	23. 33	159. 50	−31. 28	139
		4	·8137	115. 57	13. 14	149. 31	−35. 4	139
9	39·416	5	·4322	160. 36	64. 4	158. 53	−31. 59	139

1857.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Feb. 9	. . .	6	·5328	144. 14	52. 53	147. 42	−36. 17	139
11	41·489	7	·5422	200. 1	90. 16	155. 40	−31. 57	139
		8	·5212	181. 49	79. 39	145. 3	−36. 5	139
12	42·505	9	·6574	210. 34	103. 41	154. 41	−31. 57	139
		0990	·6028	196. 52	93. 25	144. 25	−36. 10	139
		1	·8970	101. 16	5. 35	56. 35	−28. 0	140
13	43·474	2	·7722	216. 12	116. 53	154. 8	−32. 9	139
		3	·7022	205. 58	106. 26	143. 41	−36. 17	139
15	45·515	4	·9478	220. 11	144. 8	152. 26	−32. 28	139
		5	·5167	117. 36	48. 3	56. 21	−27. 45	140
16	46·507	6	·9885	219. 40	156. 53	151. 7	−32. 48	139
		7	·3994	136. 48	62. 10	56. 24	−27. 51	140
17	47·581	8	·3627	168. 34	77. 7	56. 7	−27. 54	140
18	. . .	9	. .	. . .	. . .	. . .	. . .	. .
20	. . .	1000	. .	. . .	. . .	. . .	. . .	. .
22	. . .	1	. .	. . .	. . .	. . .	. . .	. .
23	. . .	2	. .	. . .	. . .	. . .	. . .	. .
24	. . .	3	. .	. . .	. . .	. . .	. . .	. .
25	. . .	4	. .	. . .	. . .	. . .	. . .	. .
26	. . .	5	. .	. . .	. . .	. . .	. . .	. .
28	. . .	6	. .	. . .	. . .	. . .	. . .	. .
Mar. 1	. . .	7	. .	. . .	. . .	. . .	. . .	. .
3	. . .	8	. .	. . .	. . .	. . .	. . .	. .
4	. . .	9	. .	. . .	. . .	. . .	. . .	. .
5	63·550	1010	·3309	183. 12	99. 32	212. 1	−24. 18	141
		1	·3128	176. 0	96. 44	209. 13	−24. 16	141
6	64·582	2	·4749	207. 22	114. 59	212. 50	−24. 9	141
		3	·4231	201. 8	110. 15	208. 6	−24. 24	141
7	. . .	4	. .	. . .	. . .	. . .	. . .	. .
8	. . .	5	. .	. . .	. . .	. . .	. . .	. .
9	. . .	6	. .	. . .	. . .	. . .	. . .	. .
10	. . .	7	. .	. . .	. . .	. . .	. . .	. .
11	. . .	8	. .	. . .	. . .	. . .	. . .	. .
12	. . .	9	. .	. . .	. . .	. . .	. . .	. .
14	. . .	1020	. .	. . .	. . .	. . .	. . .	. .
15	73·519	1	·7838	98. 11	51. 15	22. 20	−29. 50	142
		2	·8304	97. 50	46. 7	17. 12	−30. 42	142
16	74·501	3	·6515	103. 53	65. 44	22. 53	−29. 44	142
17	75·523	4	·5166	116. 9	80. 31	23. 10	−30. 8	142
18	76·514	5	·4216	135. 51	94. 19	22. 55	−30. 16	142
21	. . .	6	. .	. . .	. . .	. . .	. . .	. .
22	. . .	7	. .	. . .	. . .	. . .	. . .	. .
23	. . .	8	. .	. . .	. . .	. . .	. . .	. .
24	. . .	9	. .	. . .	. . .	. . .	. . .	. .
26	. . .	1030	. .	. . .	. . .	. . .	. . .	. .
27	. . .	1	. .	. . .	. . .	. . .	. . .	. .
28	. . .	2	. .	. . .	. . .	. . .	. . .	. .
31	89·633	3	·8188	284. 48	160. 41	263. 12	+27. 57	143
April 1	90·570	4	·9046	279. 19	173. 55	263. 8	+28. 21	143
		5	·9691	90. 22	40. 32	129. 45	−27. 22	144
6	95·523	6	·3773	142. 56	117. 49	136. 47	−27. 43	144
		7	·4405	120. 28	106. 39	125. 37	−27. 24	144
7	96·614	8	·3970	176. 41	133. 26	136. 55	−27. 14	144

1857.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Apr. 7		1039	·4041	150. 12	121. 49	125. 18	−29. 40	144
9	98·555	1040	·6393	207. 24	160. 30	136. 27	−26. 57	144
		1	·5279	192. 4	147. 25	123. 22	−29. 46	144
10	99·502	2	·7654	213. 14	173. 41	136. 13	−26. 43	144
		3	·6443	202. 48	160. 13	122. 45	−29. 41	144
12	101·577	4	·9596	217. 11	202. 31	135. 36	−27. 2	144
		5	·8760	212. 14	187. 47	120. 52	−30. 9	144
		6	·8995	94. 6	65. 14	358. 19	−29. 40	145
14	. . .	7	. .	. . .	. . .	. . .	. . .	. .
15	. . .	8	. .	. . .	. . .	. . .	. . .	. .
17	. . .	9	. .	. . .	. . .	. . .	. . .	. .
18	. . .	1050	. .	. . .	. . .	. . .	. . .	. .
19	. . .	1	. .	. . .	. . .	. . .	. . .	. .
20	. . .	2	. .	. . .	. . .	. . .	. . .	. .
21	. . .	3	. .	. . .	. . .	. . .	. . .	. .
24	. . .	4	. .	. . .	. . .	. . .	. . .	. .
27	. . .	5	. .	. . .	. . .	. . .	. . .	. .
29	118·517	6	·9742	87. 0	67. 28	120. 17	−21. 50	146
30	119·494	7	·8974	87. 34	82. 33	121. 30	−21. 21	146
		8	·9330	87. 37	77. 7	116. 4	−21. 52	146
May 2	121·483	9	·6346	95. 48	111. 30	122. 14	−21. 24	146
		1060	·7084	92. 42	105. 0	115. 44	−21. 18	146
3	122·583	1	·4632	108. 21	127. 7	122. 15	−21. 29	146
5	124·590	2	·3227	169. 29	155. 2	121. 42	−21. 47	146
6	125·487	3	·4099	196. 16	167. 41	121. 38	−21. 42	146
7	126·623	4	·5823	213. 12	183. 48	121. 38	−21. 44	146
9	128·623	5	·8551	223. 51	211. 45	121. 13	−21. 48	146
		6	·6441	104. 15	119. 52	29. 20	−25. 5	147
		7	·6923	103. 27	115. 56	25. 24	−26. 16	147
11	130·483	8	·9867	226. 22	237. 5	120. 10	−21. 52	146
		9	·4142	139. 26	147. 33	30. 38	−25. 52	147
		1070	·4330	128. 57	142. 55	26. 0	−24. 57	147
13	132·463	1	·4853	192. 28	175. 41	30. 41	−26. 13	147
		2	·4502	181. 17	169. 24	24. 24	−27. 3	147
14	133·521	3	·6404	207. 48	191. 53	31. 52	−26. 57	147
		4	·5623	205. 15	185. 48	25. 47	−25. 1	147
		5	·5667	196. 26	182. 23	22. 22	−28. 56	147
		6	·3568	144. 29	153. 44	353. 43	−22. 40	148
		7	·3640	140. 29	152. 6	352. 5	−22. 39	148
		8	·9553	46. 4	88. 59	288. 58	+20. 51	152
15	134·514	9	·7581	215. 28	204. 50	30. 44	−26. 32	147
		1080	·6780	206. 6	194. 44	20. 38	−29. 29	147
		1	·8973	43. 25	99. 56	285. 50	+21. 40	152
16	135·511	2	·8719	219. 41	218. 56	30. 42	−26. 50	147
		3	·7969	213. 49	208. 50	20. 36	−29. 8	147
		4	·7430	36. 5	119. 9	290. 55	+22. 18	152
		5	·7927	40. 53	113. 13	284. 59	+20. 38	152
		6	·7285	115. 22	123. 56	295. 42	−33. 20	151
		7	·7319	112. 16	122. 14	294. 0	−31. 34	151
		8	·8644	106. 33	106. 18	278. 4	−32. 44	153
17	136·525	9	·9592	222. 25	234. 30	31. 53	−26. 45	147
		1090	·8917	218. 0	222. 3	19. 26	−29. 1	147
		1	·5944	24. 42	135. 5	292. 28	+22. 48	152

1857.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
May 17		1092	·6673	34. 18	126. 38	284. 1	+20. 52	152
		3	·6160	122. 26	136. 19	293. 42	−31. 14	151
18	137·525	4	·9606	220. 1	235. 24	18. 36	−29. 19	147
		5	·4630	6. 27	150. 14	293. 26	+22. 20	152
		6	·5351	25. 10	139. 18	282. 30	+20. 10	152
		7	·3780	178. 4	170. 20	313. 32	−23. 3	150
		8	·3472	172. 26	167. 39	310. 51	−21. 50	150
		9	·5171	142. 35	152. 37	295. 49	−31. 30	151
		1100	·6619	120. 15	133. 7	276. 19	−32. 18	153
19	138·593	1	·4135	336. 14	165. 54	293. 57	+22. 16	152
		2	·4064	346. 3	161. 35	289. 38	+21. 45	152
		3	·4101	3. 49	154. 5	282. 8	+20. 3	152
		4	·4982	202. 28	185. 21	313. 24	−23. 26	150
		5	·4553	197. 12	181. 17	309. 20	−23. 9	150
		6	·6258	120. 42	136. 35	264. 38	−30. 27	154
20	139·504	7	·8691	281. 52	220. 17	335. 24	+25. 41	149
		8	·6303	213. 56	198. 17	313. 24	−23. 36	150
		9	·5799	210. 33	193. 45	308. 52	−23. 28	150
		1110	·4672	313. 2	178. 25	293. 32	+22. 32	152
		1	·4339	318. 39	174. 58	290. 5	+21. 47	152
24	143·513	2	·9229	277. 59	233. 2	291. 17	+23. 16	152
		3	·9824	228. 20	247. 20	305. 35	−23. 24	150
		4	·7041	202. 13	201. 46	260. 1	−33. 32	154
		5	·5094	67. 20	138. 23	196. 38	+ 1. 7	155
26	145·519	6	·9883	94. 22	89. 56	119. 44	−21. 41	157
27	146·504	7	·9373	95. 29	103. 26	119. 16	−21. 25	157
28	147·544	8	·8408	98. 28	117. 58	119. 3	−21. 26	157
30	149·511	9	·5742	112. 33	145. 44	118. 55	−21. 29	157
June 1	151·500	1120	·7411	285. 13	219. 37	164. 35	+21. 39	156
		1	·3692	157. 7	173. 21	118. 19	−21. 49	157
2	152·672	2	·8781	280. 20	236. 5	164. 26	+21. 41	156
		3	·4150	192. 28	189. 15	117. 36	−21. 53	157
		4	·9884	103. 18	97. 31	25. 52	−27. 46	158
3	153·580	5	·9560	278. 35	249. 33	165. 1	+21. 52	156
		6	·5283	211. 4	202. 12	117. 40	−21. 50	157
		7	·9532	104. 38	108. 28	23. 56	−27. 38	158
4	154·505	8	·6562	221. 26	214. 42	117. 3	−21. 49	157
		9	·8992	108. 18	119. 23	21. 44	−28. 47	158
5	155·507	1130	·7892	228. 25	228. 35	116. 43	−21. 36	157
		1	·8084	113. 17	132. 45	20. 53	−28. 59	158
		2	·8728	110. 10	124. 23	12. 31	−29. 1	158
7	157·658	3	·9731	235. 17	257. 31	115. 8	−21. 11	157
		4	·5854	134. 57	161. 19	18. 56	−29. 19	158
		5	·6518	126. 24	153. 7	10. 44	−29. 13	158
8	158·561	6	·5222	151. 25	173. 30	18. 19	−29. 36	158
		7	·5620	139. 51	165. 42	10. 31	−29. 21	158
10	. . .	8	. .	. . .	. . .	. . .	. . .	. .
11	. . .	9	. .	. . .	. . .	. . .	. . .	. .
12	. . .	1140	. .	. . .	. . .	. . .	. . .	. .
13	. . .	1	. .	. . .	. . .	. . .	. . .	. .
14	164·518	2	·5928	210. 41	213. 58	334. 17	−25. 38	159
		3	·5477	208. 16	210. 28	330. 47	−24. 22	159
15	165·509	4	·6709	221. 11	224. 11	330. 26	−24. 3	159

1857.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
June 15		1145	·7561	128. 7	152. 26	258. 41	−32. 54	160
16	. . .	6	. .	. . .	. . .	. . .	. . .	. .
17	. . .	7	. .	. . .	. . .	. . .	. . .	. .
18	. . .	8	. .	. . .	. . .	. . .	. . .	. .
19	. . .	9	. .	. . .	. . .	. . .	. . .	. .
20	. . .	1150	. .	. . .	. . .	. . .	. . .	. .
21	. . .	1	. .	. . .	. . .	. . .	. . .	. .
22	. . .	2	. .	. . .	. . .	. . .	. . .	. .
23	173·518	3	·9774	106. 21	121. 29	114. 8	−21. 19	161
24	174·528	4	·9187	109. 4	134. 35	112. 55	−21. 28	161
25	175·529	5	·8229	113. 46	148. 23	112. 31	−21. 52	161
26	176·421	6	·7160	119. 41	160. 35	112. 4	−21. 53	161
27	177·645	7	·5651	133. 6	176. 48	110. 55	−22. 3	161
28	178·512	8	·4710	149. 16	188. 41	110. 30	−22. 6	161
29	179·667	9	·4268	180. 15	204. 40	110. 6	−22. 17	161
		1160	·8851	124. 34	148. 25	53. 51	−31. 10	163
		1	·9231	122. 22	142. 0	47. 26	−31. 6	163
July 6	186·474	2	·7115	300. 36	251. 20	60. 13	+23. 55	162
		3	·6063	308. 11	241. 4	49. 57	+25. 2	162
		4	·8518	119. 14	156. 13	325. 6	−22. 32	164
7	187·531	5	·8418	296. 20	266. 3	59. 56	+23. 41	162
		6	·7482	300. 52	255. 37	49. 30	+24. 51	162
		7	·7351	126. 15	170. 29	324. 22	−22. 40	164
8	188·587	8	·9375	295. 2	280. 37	59. 32	+23. 57	162
		9	·8684	297. 7	270. 11	49. 6	+24. 34	162
		1170	·5386	149. 18	193. 42	332. 37	−23. 38	164
		1	·6821	89. 53	168. 37	307. 32	+ 3. 25	165
		2	·7553	90. 28	162. 36	301. 31	+ 2. 43	165
9	189·493	3	·9859	295. 5	293. 17	59. 20	+24. 7	162
		4	·4914	91. 51	183. 2	309. 5	+ 3. 4	165
		5	·5999	91. 42	175. 38	301. 41	+ 2. 49	165
11	191·494	6	·0297	153. 47	213. 29	311. 9	+ 2. 34	165
		7	·1818	98. 29	203. 55	301. 35	+ 2. 50	165
12	192·503	8	·2339	264. 49	228. 36	311. 58	+ 2. 14	165
		9	·0592	261. 49	218. 35	301. 57	+ 3. 31	165
13	193·495	1180	·7655	237. 54	258. 52	328. 9	−22. 58	164
		1	·4674	269. 45	243. 55	313. 12	+ 2. 14	165
		2	·3049	272. 23	233. 54	303. 11	+ 3. 51	165
		3	·9566	128. 51	149. 40	218. 57	−22. 23	166
14	194·505	4	·6015	273. 20	254. 3	309. 1	+ 3. 22	165
		5	·8921	133. 20	163. 12	218. 10	−22. 17	166
15	. . .	6	. .	. . .	. . .	. . .	. . .	. .
16	. . .	7	. .	. . .	. . .	. . .	. . .	. .
17	197·529	8	·7166	61. 26	178. 11	190. 15	+26. 39	167
		9	·7622	63. 39	173. 30	185. 34	+26. 24	167
18	198·698	1190	·5315	50. 51	196. 17	191. 46	+26. 6	167
		1	·6690	56. 4	185. 4	180. 33	+28. 50	167
		2	·6173	57. 54	188. 15	183. 44	+25. 58	167
19	199·524	3	·4189	34. 35	208. 59	192. 45	+26. 7	167
		4	·5257	49. 10	198. 10	181. 56	+26. 45	167
20	200·517	5	·3631	4. 18	223. 38	193. 19	+26. 5	167
		6	·3847	20. 59	216. 36	186. 17	+26. 36	167
		7	·4080	30. 0	212. 18	181. 59	+26. 37	167

1857.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
July 20		1198	·4561	31. 55	209. 51	179. 32	+28. 55	167
21	201·497	9	·3797	349. 57	230. 45	186. 32	+26. 11	167
		1200	·3773	2. 51	225. 24	181. 11	+27. 0	167
22	202·600	1	·5690	319. 15	252. 57	193. 6	+26. 53	167
		2	·4986	322. 50	247. 27	187. 36	+25. 33	167
		3	·4481	335. 25	240. 8	180. 17	+27. 14	167
23	203·489	4	·6894	311. 27	265. 18	192. 50	+26. 37	167
		5	·6347	312. 44	260. 40	188. 12	+25. 42	167
		6	·5501	321. 58	251. 47	179. 19	+27. 15	167
24	204·504	7	·7831	307. 51	275. 46	188. 54	+26. 28	167
		8	·6835	313. 30	265. 10	178. 18	+27. 31	167
25	205·622	9	·9058	304. 47	292. 8	189. 25	+26. 8	167
		1210	·8226	308. 18	280. 59	178. 16	+27. 28	167
		1	·9270	74. 47	159. 47	57. 4	+23. 46	168
26	206·622	2	·9794	304. 33	308. 6	191. 11	+26. 20	167
		3	·9185	306. 25	294. 58	178. 3	+27. 28	167
		4	·8303	73. 18	173. 46	56. 51	+24. 1	168
28	...	5	..	...	...	...	...	..
29	...	6	..	...	...	...	...	..
30	...	7	..	...	...	...	...	..
31	...	8	..	...	...	...	...	..
Aug. 3	...	9	..	...	...	...	...	..
4	...	1220	..	...	...	...	...	..
5	...	1	..	...	...	...	...	..
6	...	2	..	...	...	...	...	..
9	...	3	..	...	...	...	...	..
10	...	4	..	...	...	...	...	..
12	223·660	5	·8825	132. 24	188. 27	189. 52	−20. 9	170
		6	·8627	77. 9	186. 18	187. 43	+27. 29	171
13	224·561	7	·7852	138. 5	201. 12	189. 50	−20. 15	170
		8	·7639	74. 47	198. 28	187. 6	+27. 31	171
14	225·581	9	·6653	147. 40	215. 0	189. 9	−20. 36	170
		1230	·6314	69. 7	212. 19	186. 28	+27. 40	171
16	227·492	1	·4736	181. 56	241. 27	188. 31	−20. 31	170
		2	·4016	39. 0	238. 51	185. 55	+28. 18	171
17	228·449	3	·4702	207. 46	255. 7	188. 36	−20. 42	170
		4	·3716	11. 39	251. 57	185. 26	+28. 21	171
18	229·489	5	·5475	231. 8	269. 40	188. 24	−20. 33	170
		6	·4440	345. 0	266. 19	185. 3	+28. 29	171
19	230·528	7	·8770	313. 1	312. 52	216. 52	+25. 27	169
		8	·8405	314. 54	308. 7	212. 7	+26. 29	169
		9	·6676	246. 12	283. 53	187. 53	−20. 24	170
		1240	·5701	329. 43	280. 22	184. 22	+28. 23	171
20	...	1	..	...	...	...	...	..
21	...	2	..	...	...	...	...	..
22	233·501	3	·9916	139. 9	177. 23	39. 13	−28. 59	173
23	234·503	4	·9460	142. 29	191. 55	39. 32	−28. 38	173
24	235·461	5	·8790	147. 9	204. 39	38. 41	−28. 31	173
25	236·526	6	·7845	155. 16	219. 7	38. 2	−28. 44	173
		7	·7596	89. 17	208. 30	27. 25	+19. 48	174
26	237·511	8	·8131	254. 3	304. 24	109. 21	−23. 27	172
		9	·6935	166. 15	232. 41	37. 38	−28. 56	173
		1250	·5904	85. 58	223. 42	28. 29	+19. 32	174

1857.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Aug. 27	238·551	1251	·9238	261. 13	321. 3	111. 15	−23. 11	172
		2	·6182	182. 42	247. 25	37. 37	−29. 8	173
		3	·4053	75. 19	238. 53	29. 5	+19. 54	174
		4	·4887	79. 12	232. 59	23. 11	+20. 47	174
28	239·510	5	·5921	199. 25	259. 52	36. 28	−29. 4	173
		6	·2619	52. 12	252. 3	28. 39	+19. 47	174
		7	·3497	62. 5	245. 59	22. 35	+21. 54	174
30	241·496	8	·6817	233. 8	286. 50	35. 15	−28. 38	173
		9	·3663	327. 57	280. 22	28. 47	+19. 29	174
31	242·500	1260	·7703	244. 33	300. 15	34. 26	−28. 17	173
		1	·5409	316. 25	294. 29	28. 40	+19. 27	174
		2	·4601	324. 29	287. 36	21. 47	+21. 7	174
Sept. 1	243·514	3	·8618	252. 45	313. 54	33. 42	−27. 57	173
		4	·6310	237. 52	288. 32	8. 20	−23. 53	175
2	244·565	5	·9408	258. 28	328. 12	33. 6	−27. 50	173
		6	·7340	250. 1	302. 0	6. 54	−23. 24	175
		7	·9388	133. 1	199. 23	264. 17	−17. 13	177
5	247·450	8	·6063	153. 16	239. 43	263. 41	−17. 4	177
		9	·4215	356. 10	280. 26	304. 24	+29. 9	176
		1270	·3751	8. 13	274. 9	298. 7	+28. 22	176
		1	·9574	93. 3	193. 47	217. 45	+20. 26	179
6	248·646	2	·5678	336. 42	297. 13	304. 13	+29. 35	176
		3	·4931	341. 41	290. 51	297. 51	+28. 30	176
		4	·8128	143. 22	221. 39	228. 39	−19. 48	178
		5	·8701	92. 43	208. 34	215. 34	+20. 46	179
		6	·9116	93. 57	202. 55	209. 55	+19. 52	179
7	249·489	7	·6804	329. 22	308. 56	303. 59	+29. 32	176
		8	·6623	154. 57	238. 48	233. 51	−20. 15	178
		9	·7094	149. 36	233. 21	228. 24	−19. 25	178
		1280	·7701	91. 47	220. 12	215. 15	+20. 39	179
		1	·8237	93. 47	214. 38	209. 41	+19. 38	179
10	252·451	2	·5021	237. 8	290. 5	243. 7	−17. 44	178
		3	·4776	220. 11	281. 32	234. 34	−20. 1	178
		4	·4574	208. 24	275. 33	228. 35	−19. 50	178
		5	·8588	150. 17	223. 11	176. 13	−26. 31	180
		6	·2808	57. 12	263. 33	216. 35	+20. 29	179
		7	·3495	74. 0	256. 31	209. 33	+19. 37	179
		8	·4394	84. 59	249. 10	202. 12	+18. 34	179
		9	·7656	88. 59	224. 0	177. 2	+23. 9	181
		1290	·8550	91. 38	214. 15	167. 17	+22. 14	181
13	255·520	1	·5406	322. 9	306. 40	216. 10	+20. 55	179
		2	·4551	323. 27	300. 51	210. 21	+19. 24	179
		3	·3722	329. 9	294. 49	204. 19	+19. 6	179
		4	·5859	186. 25	264. 46	174. 16	−26. 51	180
		5	·2878	46. 24	269. 20	178. 50	+22. 26	181
		6	·4406	71. 16	255. 27	164. 57	+23. 59	181
		7	·9460	135. 39	208. 57	118. 27	−17. 50	182
14	256·668	8	·7195	316. 52	322. 27	215. 40	+21. 10	179
		9	·6133	316. 51	313. 58	207. 11	+19. 23	179
		1300	·5516	316. 13	309. 37	202. 50	+17. 57	179
		1	·5569	209. 3	280. 18	173. 31	−26. 27	180
		2	·3008	358. 27	285. 21	178. 34	+22. 42	181
		3	·3183	43. 39	270. 35	163. 48	+24. 27	181

1857.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Sept. 14		1304	·8430	140. 26	224. 58	118. 11	−17. 36	182
16	258·496	5	·9017	313. 59	344. 2	211. 19	+20. 38	179
		6	·8257	310. 25	335. 0	202. 17	+17. 9	179
		7	·6721	240. 19	305. 5	172. 22	−26. 34	180
		8	·5684	325. 11	310. 57	178. 14	+22. 52	181
		9	·3978	344. 36	295. 15	162. 32	+24. 31	181
		1310	·5815	157. 20	252. 43	120. 0	−16. 54	182
		1	·6175	156. 18	250. 14	117. 31	−18. 4	182
17	259·489	2	·9804	313. 18	0. 9	213. 21	+19. 39	179
		3	·9256	310. 35	348. 37	201. 49	+17. 25	179
		4	·7711	250. 51	318. 28	171. 40	−26. 41	180
		5	·7193	319. 46	324. 48	178. 0	+22. 50	181
		6	·5494	330. 22	309. 20	162. 32	+24. 51	181
		7	·4617	176. 31	266. 57	120. 9	−17. 4	182
		8	·4931	172. 34	264. 9	117. 21	−17. 49	182
18	260·413	9	·8574	257. 32	330. 39	170. 45	−26. 44	180
		1320	·8334	317. 20	337. 12	177. 18	+22. 39	181
		1	·6873	323. 59	322. 10	162. 16	+24. 55	181
		2	·4083	203. 54	280. 35	120. 41	−16. 57	182
		3	·4217	196. 20	277. 15	117. 21	−17. 31	182
20	262·476	4	·9838	316. 26	4. 20	175. 10	+22. 14	181
		5	·5945	253. 25	310. 33	121. 23	−17. 0	182
		6	·5503	248. 47	306. 19	117. 9	−16. 57	182
		7	·9266	96. 33	214. 15	25. 5	+19. 44	184
		8	·9630	94. 48	207. 20	18. 10	+21. 19	184
21	263·451	9	·7145	266. 3	324. 2	121. 2	−15. 1	182
		1330	·6911	260. 14	320. 17	117. 17	−17. 41	182
		1	·8288	96. 36	227. 50	24. 50	+19. 14	184
		2	·8859	94. 44	221. 11	18. 11	+21. 17	184
23	265·474	3	·5139	89. 20	256. 50	25. 9	+19. 4	184
		4	·6232	88. 39	249. 16	17. 35	+21. 50	184
24	266·489	5	·3015	38. 31	282. 42	36. 37	+23. 51	183
		6	·3322	75. 2	271. 31	25. 26	+19. 1	184
		7	·4572	79. 10	263. 39	17. 34	+21. 59	184
26	268·471	8	·4767	332. 21	313. 17	39. 5	+22. 39	183
		9	·4183	349. 28	304. 49	30. 37	+26. 10	183
		1340	·2824	346. 9	299. 50	25. 38	+19. 11	184
29	271·458	1	·9195	317. 39	359. 15	42. 41	+22. 29	183
		2	·8188	324. 22	345. 31	28. 57	+26. 53	183
30	272·472	3	·9819	317. 36	13. 28	42. 31	+22. 20	183
		4	·9111	323. 6	358. 33	27. 36	+27. 17	183
		5	·8996	142. 42	233. 56	262. 59	−20. 26	185
Oct. 1	273·503	6	·9692	323. 4	10. 54	25. 20	+27. 40	183
2	274·479	7	·8553	99. 19	235. 48	236. 23	+17. 47	186
		8	·9913	97. 50	210. 56	211. 31	+18. 59	187
5	277·513	9	·7249	96. 7	252. 3	209. 36	+18. 57	187
		1350	·9859	95. 35	216. 0	173. 33	+21. 27	189
6	278·452	1	·5788	92. 2	265. 2	209. 15	+19. 0	187
		2	·9319	95. 52	229. 27	173. 40	+21. 20	189
10	282·474	3	·3822	332. 51	321. 38	208. 49	+18. 47	187
		4	·3892	73. 34	285. 2	172. 13	+21. 2	189
		5	·6059	177. 45	283. 55	171. 6	−26. 18	190
		6	·7717	160. 37	264. 11	151. 22	−27. 48	191

1857.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Oct. 10		1357	·9115	140. 57	241. 27	128. 38	−19. 26	192
13	285·499	8	·8476	315. 32	3. 34	207. 50	+19. 18	187
		9	·4245	335. 31	326. 19	170. 35	+20. 57	189
		1360	·7628	265. 4	349. 13	193. 29	−19. 6	188
		1	·5127	170. 34	287. 22	131. 38	−18. 57	192
		2	·6084	160. 18	278. 8	122. 24	−19. 44	192
14	286·471	3	·9399	314. 59	17. 18	207. 47	+19. 29	187
		4	·5849	325. 30	339. 51	170. 20	+21. 21	189
		5	·4126	193. 36	301. 17	131. 46	−17. 54	192
		6	·4956	176. 25	291. 35	122. 4	−19. 47	192
16	288·507	7	·8907	317. 29	11. 37	173. 13	+21. 25	189
		8	·5225	246. 40	329. 33	131. 9	−18. 7	192
		9	·4865	226. 55	319. 21	120. 57	−21. 27	192
		1370	·8953	90. 22	245. 43	47. 19	+25. 35	194
17	289·499	1	·6564	260. 6	343. 32	131. 4	−18. 6	192
		2	·5738	245. 2	332. 23	119. 55	−21. 22	192
		3	·7935	87. 37	259. 13	46. 45	+25. 49	194
19	291·594	4	·9052	272. 49	12. 50	130. 39	−18. 21	192
		5	·8204	265. 26	0. 52	118. 41	−21. 11	192
		6	·5177	182. 25	298. 51	56. 40	−22. 59	193
		7	·5102	71. 19	288. 11	46. 0	+25. 53	194
		8	·7089	85. 25	269. 39	27. 28	+25. 7	194
20	292·568	9	·9679	275. 31	25. 17	129. 17	−18. 14	192
		1380	·9360	269. 2	17. 31	121. 31	−22. 53	192
		1	·4817	205. 35	312. 36	56. 36	−23. 24	193
		2	·4789	198. 7	308. 44	52. 44	−22. 56	193
		3	·3933	50. 53	302. 14	46. 14	+26. 0	194
23	295·546	4	·7298	257. 16	354. 1	55. 47	−23. 0	193
		5	·5687	336. 36	344. 17	46. 3	+26. 12	194
		6	·5157	347. 58	336. 46	38. 32	+28. 40	194
		7	·3843	5. 3	324. 24	26. 10	+25. 56	194
24	296·482	8	·7031	329. 2	357. 30	45. 59	+26. 29	194
26	298·465	9	·9212	322. 29	25. 7	45. 29	+26. 45	194
		1390	·9838	82. 55	238. 16	258. 38	+32. 45	198
27	299·545	1	·3713	290. 32	341. 24	346. 26	+ 2. 35	195
		2	·3220	288. 56	338. 22	343. 24	+ 2. 23	195
		3	·9797	140. 28	244. 49	249. 51	−23. 32	200
		4	·9628	79. 45	246. 2	251. 4	+35. 21	198
		5	·9849	93. 39	238. 57	243. 59	+22. 2	199
28	300·518	6	·5762	293. 43	355. 48	347. 2	+ 2. 56	195
		7	·9229	143. 3	258. 9	249. 23	−23. 33	200
		8	·9035	77. 29	259. 13	250. 27	+35. 39	198
		9	·9342	93. 23	251. 42	242. 56	+21. 53	199
30	302·492	1400	·8951	266. 52	21. 23	344. 37	−22. 32	196
		1	·7120	154. 32	286. 11	249. 25	−23. 30	200
		2	·7838	146. 53	277. 20	240. 34	−21. 30	200
		3	·6636	65. 37	291. 22	254. 36	+33. 47	198
		4	·7202	89. 7	278. 44	241. 58	+21. 18	199
		5	·7822	87. 52	273. 22	236. 36	+23. 34	199
Nov. 1	304·568	6	·7448	261. 25	6. 32	300. 19	−20. 49	197
		7	·7781	266. 49	11. 8	304. 55	−18. 16	197
		8	·5040	185. 50	314. 39	248. 26	−24. 19	200
		9	·5500	166. 37	303. 34	237. 21	−21. 47	200

1857.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Nov. 1		1410	·7182	149. 13	285. 46	219. 33	−20. 53	200
		1	·4176	68. 34	306. 41	240. 28	+21. 19	199
8	311·564	2	·9607	269. 21	42. 41	237. 14	−21. 36	200
		3	·6789	145. 57	294. 53	129. 26	−18. 51	201
9	312·456	4	·5505	155. 32	307. 28	129. 22	−18. 51	201
11	314·476	5	·3701	203. 46	335. 15	128. 30	−18. 32	201
15	318·490	6	·8311	266. 51	31. 26	127. 45	−18. 29	201
		7	·5419	165. 23	318. 32	54. 51	−23. 29	203
		8	·5741	160. 11	314. 25	50. 44	−23. 9	203
		9	·6494	73. 42	304. 8	40. 27	+25. 24	204
		1420	·7300	80. 21	295. 40	31. 59	+23. 53	204
18	321·520	1	·5405	240. 7	3. 36	56. 56	−22. 22	203
		2	·4856	226. 46	355. 18	48. 38	−23. 29	203
		3	·4089	8. 50	346. 57	40. 17	+25. 45	204
		4	·3862	33. 0	336. 28	29. 48	+24. 17	204
		5	·5682	151. 34	314. 49	8. 9	−19. 52	205
		6	·6988	141. 12	302. 28	355. 48	−19. 10	205
		7	·8349	87. 29	286. 56	340. 16	+20. 13	206
19	322·621	8	·9398	251. 9	46. 9	83. 52	−35. 10	202
		9	·6938	253. 34	19. 53	57. 36	−22. 35	203
		1430	·6308	246. 16	12. 37	50. 20	−23. 56	203
		1	·4590	166. 47	327. 21	5. 4	−20. 25	205
		2	·9472	128. 47	273. 26	311. 9	−16. 17	207
22	325·618	3	·9362	262. 56	52. 11	47. 24	−23. 38	203
		4	·5765	142. 39	315. 51	311. 4	−17. 0	207
25	328·497	5	·3424	220. 18	356. 30	310. 53	−17. 0	207
27	330·511	6	·6166	257. 32	24. 37	310. 25	−16. 51	207
28	331·513	7	·7626	263. 27	38. 35	310. 10	−16. 59	207
Dec. 4	337·493	8	·5004	141. 22	333. 7	159. 53	−17. 5	208
		9	·6995	60. 9	323. 0	149. 46	+29. 29	209
5	338·506	1440	·3471	161. 14	347. 30	159. 54	−16. 42	208
		1	·5943	47. 22	336. 56	149. 20	+29. 51	209
8	341·486	2	·5288	250. 25	29. 26	159. 34	−16. 41	208
		3	·5548	347. 40	17. 38	147. 46	+29. 45	209
11	344·504	4	·6301	145. 8	334. 23	61. 42	−26. 7	210
19	352·492	5	·9527	248. 38	83. 21	57. 22	−28. 22	210
		6	·9670	254. 31	87. 18	61. 19	−23. 6	210
		7	·8520	306. 10	67. 17	41. 18	+22. 42	211
		8	·8321	310. 43	63. 43	37. 44	+25. 37	211
		9	·7763	315. 54	56. 20	30. 21	+27. 12	211
		1450	·3753	351. 37	19. 23	353. 24	+19. 24	213
		1	·3926	13. 10	10. 48	344. 49	+21. 18	213
		2	·5242	47. 7	352. 6	326. 7	+22. 24	214
		3	·6688	67. 40	335. 39	309. 40	+18. 24	215
		4	·7777	70. 39	325. 55	299. 56	+19. 48	215
23	356·450	5	·8429	283. 52	73. 45	351. 37	+ 5. 20	212
		6	·6349	317. 26	48. 1	325. 53	+22. 53	214
		7	·6170	310. 26	49. 20	327. 12	+18. 29	214
		8	·4353	328. 1	33. 18	311. 10	+17. 55	215
29	362·512	9	·3513	14. 35	18. 57	210. 50	+17. 14	216
31	364·536	1460	·4995	317. 1	46. 54	210. 5	+17. 41	216
Jan. 4	3·520	1	·9644	289. 42	101. 36	208. 16	+17. 39	216
1858.		2	·5378	191. 4	36. 14	142. 54	−35. 14	217

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Jan. 4		1463	·7640	120. 19	342. 35	89. 15	−24. 51	220
		4	·9128	121. 3	325. 16	71. 56	−29. 22	220
		5	·6478	97. 43	348. 59	95. 39	− 7. 29	219
		6	·9610	111. 40	315. 22	62. 2	−21. 30	220
9	8·635	7	·6979	281. 15	77. 17	111. 24	+ 6. 20	218
		8	·4190	256. 16	58. 48	92. 55	− 8. 29	219
		9	·4700	214. 0	52. 18	86. 25	−26. 4	220
		1470	·4600	204. 0	47. 40	81. 47	−28. 14	220
		1	·4195	176. 53	33. 56	68. 3	−28. 45	220
		2	·4810	150. 46	19. 56	54. 3	−29. 12	220
		3	·4608	129. 34	12. 47	46. 54	−21. 35	220
11	10·551	4	·9348	276. 33	104. 26	111. 22	+ 7. 27	218
		5	·7641	259. 13	86. 7	93. 3	− 8. 36	219
		6	·6810	228. 31	73. 31	80. 27	−28. 20	220
		7	·5385	219. 37	60. 28	67. 24	−27. 6	220
		8	·4535	197. 22	46. 46	53. 42	−29. 13	220
		9	·3962	189. 27	41. 51	48. 47	−26. 53	220
		1480	·3032	186. 46	39. 31	46. 27	−21. 33	220
12	11·510	1	·8872	258. 48	99. 54	93. 14	− 8. 47	219
		2	·7962	233. 28	86. 35	79. 55	−28. 29	220
		3	·8438	236. 50	92. 36	85. 56	−27. 6	220
		4	·6703	229. 23	74. 9	67. 29	−27. 14	220
		5	·5483	214. 59	60. 17	53. 37	−29. 18	220
		6	·4744	212. 16	55. 21	48. 41	−26. 40	220
		7	·3905	217. 5	53. 5	46. 25	−21. 21	220
		8	·5184	203. 22	53. 15	46. 35	−31. 36	220
13	12·473	9	·9649	257. 56	113. 17	92. 57	− 8. 55	219
		1490	·9295	238. 37	105. 57	85. 37	−27. 0	220
		1	·8951	235. 48	100. 8	79. 48	−28. 51	220
		2	·7766	232. 33	85. 31	65. 11	−28. 19	220
		3	·6733	225. 3	74. 1	53. 41	−29. 43	220
		4	·5940	225. 2	68. 19	47. 59	−26. 42	220
		5	·5358	231. 35	66. 32	46. 12	−21. 29	220
		6	·6192	218. 18	67. 18	46. 58	−31. 3	220
		7	·9573	64. 6	328. 9	307. 49	+19. 24	222
14	13·470	8	·9596	236. 40	112. 50	78. 22	−28. 54	220
		9	·7953	231. 20	88. 13	53. 45	−29. 29	220
		1500	·7272	232. 14	82. 4	47. 36	−26. 49	220
		1	·6898	238. 41	80. 34	46. 6	−21. 31	220
		2	·7692	224. 59	83. 28	49. 0	−33. 12	220
		3	·8095	51. 58	352. 8	317. 40	+23. 26	222
		4	·9338	58. 52	334. 36	300. 8	+22. 49	222
17	. . .	5	. .	. . .	. . .	. . .	. . .	. .
18	17·570	6	·7266	238. 18	88. 14	355. 36	−21. 34	221
		7	·6894	235. 51	84. 36	351. 58	−22. 25	221
19	18·529	8	·8071	239. 13	97. 3	350. 49	−22. 10	221
		9	·4554	32. 55	26. 55	280. 41	+15. 36	223
		1510	·9800	47. 18	332. 8	225. 54	+33. 35	224
21	20·490	1	·8602	37. 49	359. 10	225. 7	+33. 29	224
22	21·581	2	·7730	28. 45	13. 43	224. 12	+33. 39	224
23	22·512	3	·6908	16. 50	27. 43	225. 0	+33. 25	224
		4	·7342	22. 10	21. 33	218. 50	+34. 11	224
24	23·482	5	·6416	1. 59	41. 2	224. 33	+33. 27	224

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Jan. 24		1516	·6634	6. 19	37. 13	220. 44	+34. 16	224
		7	·8099	108. 14	357. 3	180. 34	−25. 9	225
25	24·556	8	·6358	344. 26	55. 9	223. 26	+33. 31	224
		9	·6497	349. 26	51. 23	219. 40	+34. 47	224
		1520	·9254	98. 46	342. 31	150. 48	−19. 2	226
26	25·644	1	·6790	327. 8	70. 0	222. 51	+33. 15	224
		2	·6797	332. 20	66. 9	219. 0	+34. 46	224
		3	·7925	100. 0	359. 51	152. 42	−19. 14	226
27	26·510	4	·7401	316. 39	81. 16	221. 50	+33. 18	224
		5	·7341	319. 45	78. 44	219. 18	+34. 19	224
		6	·6547	102. 45	13. 6	153. 40	−19. 18	226
		7	·7359	101. 52	6. 16	146. 50	−20. 8	226
28	27·509	8	·8247	307. 14	94. 49	221. 13	+33. 28	224
		9	·8143	310. 16	91. 57	218. 21	+34. 45	224
		1530	·4754	109. 40	28. 0	154. 24	−19. 8	226
		1	·5901	104. 58	19. 24	145. 48	−19. 38	226
31	30·491	2	·9867	294. 43	130. 31	214. 37	+34. 44	224
		3	·3258	212. 15	70. 31	154. 37	−19. 15	226
		4	·6894	43. 34	20. 0	104. 6	+18. 3	227
		5	·9512	107. 15	344. 13	68. 19	−29. 41	229
Feb. 1	31·511	6	·5008	229. 21	85. 22	155. 0	−19. 0	226
		7	·5263	28. 15	36. 36	106. 14	+17. 45	227
		8	·8710	108. 1	358. 25	68. 3	−29. 24	229
5	35·511	9	·6809	286. 38	98. 56	111. 50	+15. 17	227
		1540	·6225	294. 43	92. 10	105. 4	+17. 27	227
		1	·4090	145. 23	52. 21	65. 15	−28. 40	229
		2	·4260	122. 58	43. 16	56. 10	−24. 6	229
		3	·5562	118. 10	34. 11	47. 5	−27. 30	229
8	38·570	4	·5826	212. 41	94. 13	63. 43	−28. 35	229
		5	·4752	212. 35	87. 31	57. 1	−24. 32	229
		6	·4528	201. 37	82. 34	52. 4	−27. 21	229
		7	·4197	190. 4	76. 35	46. 5	−28. 34	229
9	39·551	8	·8834	282. 0	122. 24	77. 59	+20. 36	228
		9	·7128	219. 47	107. 40	63. 15	−28. 46	229
		1550	·6239	222. 33	101. 19	56. 54	−24. 32	229
		1	·5423	206. 49	90. 35	46. 10	−29. 29	229
18	48·573	2	·6609	29. 15	43. 35	231. 12	+20. 19	230
		3	·6482	96. 18	36. 5	223. 42	−21. 17	231
		4	·7222	96. 50	30. 6	217. 43	−23. 3	231
19	49·647	5	·5301	11. 57	59. 16	231. 39	+20. 17	230
		6	·4687	103. 34	51. 12	223. 35	−20. 54	231
		7	·5646	103. 21	44. 54	217. 17	−23. 31	231
		8	·8680	51. 29	19. 9	191. 32	+13. 5	232
		9	·9679	98. 59	359. 13	171. 36	−28. 47	233
22	52·558	1560	·3376	205. 44	93. 54	224. 59	−20. 24	231
		1	·3057	177. 57	84. 54	215. 59	−23. 51	231
		2	·6982	104. 13	38. 8	169. 13	−28. 23	233
28	58·560	3	·6215	208. 20	118. 6	164. 3	−29. 35	233
		4	·4081	358. 7	76. 58	122. 55	+15. 26	234
		5	·4375	6. 42	72. 46	118. 43	+15. 36	234
		6	·6840	16. 51	57. 1	102. 58	+26. 3	235
		7	·7727	35. 17	41. 51	87. 48	+19. 49	235
		8	·8228	37. 14	36. 35	82. 32	+20. 33	235

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Feb. 28		1569	·9546	88. 33	11. 16	57. 13	−21. 15	239
		1570	·9558	94. 41	10. 59	56. 56	−27. 6	239
Mar. 4	62·526	1	·6426	305. 7	111. 35	101. 17	+26. 8	235
		2	·6516	310. 43	108. 36	98. 18	+28. 42	235
		3	·5952	311. 23	105. 55	95. 37	+25. 19	235
		4	·4757	321. 28	97. 8	86. 50	+20. 0	235
		5	·4382	104. 21	67. 2	56. 44	−21. 50	239
		6	·5000	110. 37	65. 10	54. 52	−26. 29	239
		7	·6390	101. 12	52. 49	42. 31	−26. 32	239
		8	·6779	97. 9	48. 44	38. 26	−25. 4	239
	·537	9	·7544	273. 39	133. 17	122. 50	+14. 17	234
		1580	·6255	350. 36	79. 43	69. 16	+30. 19	238
		1	·6651	353. 35	76. 32	66. 5	+32. 35	238
		2	·9079	34. 7	31. 38	21. 11	+26. 13	241
6	64·611	3	·9544	264. 33	160. 56	121. 4	+14. 17	234
		4	·9509	265. 36	160. 1	120. 9	+15. 7	234
		5	·8568	283. 43	141. 3	101. 11	+26. 13	235
		6	·8172	290. 32	133. 44	93. 52	+28. 59	235
		7	·6902	286. 2	125. 51	85. 59	+19. 49	235
		8	·8527	298. 17	132. 36	92. 44	+36. 21	236
		9	·8392	301. 49	128. 46	88. 54	+37. 37	236
		1590	·6775	311. 1	111. 22	71. 30	+30. 40	238
		1	·7032	16. 59	61. 4	21. 12	+26. 22	241
		2	·8243	22. 48	48. 27	8. 35	+29. 52	241
		3	·2709	173. 23	95. 56	56. 4	−22. 8	239
		4	·3377	164. 21	93. 58	54. 6	−26. 38	239
		5	·3589	133. 40	82. 8	42. 16	−26. 14	239
		6	·3717	123. 10	78. 5	38. 13	−24. 53	239
		7	·6735	88. 47	49. 43	9. 51	−19. 50	242
		8	·9936	88. 59	5. 36	325. 44	−22. 31	243
7	65·646	9	·9198	290. 40	146. 45	92. 12	+35. 35	236
		1600	·8991	294. 57	141. 14	86. 41	+37. 27	236
		1	·7596	297. 35	125. 51	71. 18	+30. 3	238
		2	·6050	2. 29	75. 22	20. 49	+26. 4	241
		3	·7350	12. 56	62. 18	7. 45	+30. 9	241
		4	·2797	347. 39	89. 14	34. 41	+ 8. 43	240
		5	·4858	94. 54	65. 20	10. 47	−19. 35	242
		6	·9347	88. 27	22. 9	327. 36	−22. 43	243
		7	·9164	283. 11	149. 47	95. 14	+29. 12	235
		8	·9086	278. 15	150. 36	96. 3	+24. 38	235
		9	·8184	277. 20	140. 38	86. 5	+19. 50	235
		1610	·3971	204. 10	110. 37	56. 4	−22. 21	239
		1	·4195	193. 12	108. 31	53. 58	−26. 33	239
		2	·3918	188. 15	105. 24	50. 51	−26. 26	239
		3	·3031	157. 54	92. 38	38. 5	−24. 43	239
		4	·9331	88. 42	22. 27	327. 54	−22. 56	243
8	66·573	5	·8467	289. 26	138. 59	71. 17	+30. 11	238
		6	·8093	293. 59	132. 51	65. 9	+31. 2	238
		7	·8386	221. 47	149. 49	82. 7	−24. 39	237
		8	·8287	218. 55	148. 18	80. 36	−26. 50	237
		9	·5451	215. 37	123. 26	55. 44	−22. 28	239
		1620	·5453	206. 55	121. 5	53. 23	−26. 40	239
		1	·5069	204. 15	117. 49	50. 7	−26. 26	239

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Mar. 8	·584	1622	·9696	274. 43	163. 38	95. 46	+24. 56	235
		3	·9057	272. 49	152. 54	85. 2	+20. 2	235
		4	·5515	344. 39	88. 19	20. 27	+25. 49	241
		5	·6629	0. 4	75. 27	7. 35	+30. 31	241
		6	·5904	354. 17	81. 39	13. 47	+27. 5	241
10	68·550	7	·9888	222. 34	178. 41	82. 56	−24. 23	237
		8	·8272	223. 24	150. 47	55. 2	−22. 50	239
		9	·8045	217. 53	147. 32	51. 47	−26. 53	239
		1630	·6238	306. 34	115. 12	19. 27	+26. 1	241
		1	·5750	315. 3	108. 26	12. 41	+25. 21	241
		2	·9560	86. 58	21. 2	285. 17	−21. 52	244
11	69·513	3	·9237	224. 29	164. 24	55. 0	−22. 36	239
		4	·7131	294. 4	128. 4	18. 40	+25. 55	241
		5	·8498	84. 38	37. 41	288. 17	−19. 30	244
		6	·8839	87. 12	33. 40	284. 16	−21. 58	244
12	70·474	7	·8076	285. 22	140. 46	17. 44	+25. 46	241
		8	·7118	86. 8	52. 16	289. 14	−19. 20	244
		9	·7763	89. 4	46. 49	283. 47	−22. 23	244
		1640	·8158	85. 59	42. 30	279. 28	−20. 28	244
15	73·480	1	·7151	11. 51	71. 12	265. 32	+28. 51	245
		2	·2372	135. 33	95. 15	289. 35	−19. 52	244
		3	·3355	120. 5	88. 4	282. 24	−22. 44	244
		4	·3926	109. 1	82. 20	276. 40	−22. 23	244
16	74·590	5	·6290	356. 39	86. 5	264. 40	+28. 55	245
		6	·9089	37. 35	41. 31	220. 6	+21. 27	246
		7	·2834	191. 28	111. 29	290. 4	−20. 4	244
		8	·2728	162. 48	103. 29	282. 4	−22. 39	244
		9	·2361	143. 1	98. 13	276. 48	−20. 18	244
		1650	·9500	81. 1	28. 27	207. 2	−17. 11	247
		1	·9670	89. 47	24. 34	203. 9	−25. 30	247
19	77·506	2	·7499	223. 37	152. 13	289. 26	−20. 23	244
		3	·6170	217. 59	140. 23	277. 36	−21. 46	244
		4	. .	. . .	. . .	. . .	. . .	. .
		5	. .	. . .	. . .	. . .	. . .	. .
		6	. .	. . .	. . .	. . .	. . .	. .
		7	. .	. . .	. . .	. . .	. . .	. .
		8	. .	. . .	. . .	. . .	. . .	. .
		9	·6941	83. 48	60. 41	197. 54	−18. 8	247
		1660	·7558	101. 39	58. 56	196. 9	−31. 53	249
20	78·478	1	·8714	224. 50	166. 3	289. 29	−20. 39	244
		2	·7371	223. 40	152. 4	275. 30	−20. 4	244
		3	·7483	218. 39	152. 18	275. 44	−23. 54	244
		4	·6439	32. 44	70. 59	194. 25	+14. 9	248
		5	·5355	87. 46	74. 5	197. 31	−18. 2	247
		6	·7083	107. 3	66. 13	189. 39	−33. 53	249
	·487	7	·4833	345. 0	99. 50	223. 8	+21. 22	246
		8	·5166	0. 31	91. 16	214. 34	+20. 53	246
		9	·3492	100. 25	87. 52	211. 10	−18. 20	247
		1670	·6268	108. 58	73. 25	196. 43	−31. 48	249
21	79·512	1	·9571	225. 15	180. 27	289. 13	−20. 25	244
		2	·9007	223. 5	170. 52	279. 38	−22. 17	244
		3	·8721	220. 40	166. 51	275. 37	−24. 8	244
		4	·8701	225. 19	166. 57	275. 43	−20. 5	244

1858	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Mar. 21		1675	·5123	121. 8	86. 53	195. 39	−31. 44	249
		6	·5876	116. 35	80. 31	189. 17	−33. 44	249
	·523	7	·4880	320. 20	113. 33	222. 10	+21. 17	246
		8	·4727	332. 34	107. 11	215. 48	+21. 11	246
		9	·4881	18. 52	85. 42	194. 19	+13. 55	248
		1680	·2090	140. 32	103. 8	211. 45	−18. 31	247
		1	·3604	98. 45	87. 59	196. 36	−18. 11	247
22	80·527	2	·9510	225. 21	180. 12	274. 35	−20. 13	244
		3	·9540	221. 11	180. 50	275. 13	−24. 11	244
		4	·5748	299. 2	128. 4	222. 27	+21. 27	246
		5	·5202	309. 6	120. 58	215. 21	+21. 17	246
		6	·3771	353. 10	100. 3	194. 26	+14. 2	248
	·537	7	·2700	194. 43	117. 46	211. 59	−18. 34	247
		8	·2019	135. 14	103. 13	197. 26	−17. 47	247
		9	·4264	145. 16	102. 39	196. 52	−31. 37	249
		1690	·4996	131. 5	93. 27	187. 40	−33. 51	249
23	81·542	1	·6225	290. 53	135. 20	215. 18	+20. 44	246
		2	·3692	319. 34	113. 45	193. 43	+14. 2	248
		3	·4420	215. 5	132. 7	212. 5	−18. 40	247
		4	·2547	188. 57	116. 57	196. 55	−18. 47	247
		5	·4382	169. 59	116. 9	196. 7	−31. 36	249
		6	·4702	149. 57	105. 42	185. 40	−34. 38	249
24	82·543	7	·7689	279. 20	151. 29	217. 15	+21. 13	246
		8	·6163	222. 32	146. 12	211. 58	−18. 35	247
		9	·4519	212. 56	133. 18	199. 4	−19. 43	247
		1700	·4850	183. 18	125. 10	190. 56	−31. 30	249
		1	·4999	171. 39	119. 41	185. 27	−35. 2	249
26	84·501	2	·9605	268. 51	180. 31	218. 31	+21. 30	246
		3	·7927	226. 4	163. 30	201. 30	−18. 18	247
		4	·2526	191. 9	120. 20	158. 20	−18. 10	250
		5	·2054	137. 45	107. 41	145. 41	−18. 0	250
		6	·2543	111. 59	100. 54	138. 54	−17. 25	250
27	85·566	7	·2753	198. 41	123. 53	146. 47	−17. 44	250
		8	·2000	169. 21	115. 23	138. 17	−17. 42	250
28	86·579	9	·4664	218. 52	139. 21	147. 53	−17. 17	250
		1710	·3208	206. 56	128. 43	137. 15	−17. 26	250
29	87·452	1	·6298	224. 15	152. 20	148. 29	−17. 20	250
April 4	93·579	2	·5325	212. 24	149. 18	58. 32	−21. 24	251
		3	·3050	100. 20	105. 26	14. 40	−16. 28	252
11	100·506	4	·5763	4. 14	108. 18	279. 17	+24. 12	254
		5	·2433	172. 32	131. 43	302. 42	−18. 58	253
		6	·2336	139. 51	123. 36	294. 35	−18. 47	253
12	101·500	7	·5054	344. 54	121. 48	278. 41	+23. 58	254
		8	·3299	193. 21	140. 50	297. 43	−20. 11	253
		9	·2822	187. 51	137. 32	294. 25	−19. 2	253
15	104·623	1720	·8171	223. 31	185. 14	297. 49	−19. 42	253
		1	·7736	223. 36	180. 57	293. 32	−19. 3	253
		2	·5208	14. 46	110. 5	222. 40	+18. 2	258
		3	·6628	24. 38	97. 59	210. 34	+20. 12	258
		4	·7259	28. 27	91. 57	204. 32	+20. 38	258
		5	·6715	84. 43	89. 55	202. 30	−17. 53	259
16	105·478	6	·9147	225. 5	198. 10	298. 38	−19. 24	253
		7	·8760	226. 28	192. 59	293. 27	−17. 52	253

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Apr. 16		1728	·8738	224. 45	192. 35	293. 3	−19. 20	253
		9	·8219	211. 17	184. 22	284. 50	−29. 36	255
		1730	·7857	209. 6	179. 56	280. 24	−30. 15	255
		1	·6060	16. 40	105. 43	206. 11	+21. 33	258
		2	·6446	19. 0	102. 24	202. 52	+22. 21	258
		3	·4900	89. 42	104. 28	204. 56	−17. 0	259
18	107·476	4	·7102	281. 50	170. 48	242. 55	+21. 34	256
		5	·4225	325. 3	137. 49	209. 56	+19. 23	258
		6	·4626	343. 50	128. 59	201. 6	+21. 50	258
		7	·8649	84. 12	74. 15	146. 22	−19. 56	260
19	108·529	8	·6332	216. 36	171. 39	228. 50	−21. 6	257
		9	·6105	212. 6	168. 53	226. 4	−23. 6	257
		1740	·4952	298. 35	152. 29	209. 40	+18. 47	258
		1	·4733	315. 20	144. 15	201. 26	+21. 28	258
		2	·2873	196. 54	146. 32	203. 43	−17. 8	259
		3	·8002	85. 53	82. 34	139. 45	−20. 19	260
20	109·619	4	·8041	221. 34	188. 21	230. 4	−21. 9	257
		5	·7589	217. 11	183. 11	224. 54	−23. 37	257
		6	·6703	279. 45	170. 57	212. 40	+18. 44	258
		7	·4759	295. 51	153. 50	195. 33	+17. 2	258
		8	·6001	89. 15	100. 58	142. 41	−18. 44	260
		9	·6694	90. 27	96. 0	137. 43	−20. 58	260
21	110·521	1750	·9096	223. 22	202. 3	230. 58	−21. 9	257
		1	·7967	272. 27	184. 30	213. 25	+18. 40	258
		2	·6148	280. 42	167. 51	196. 46	+17. 4	258
		3	·5487	287. 31	161. 29	190. 24	+17. 29	258
		4	·4293	98. 41	114. 54	143. 49	−18. 31	260
		5	·5278	97. 57	108. 43	137. 38	−21. 15	260
22	111·517	6	·9044	267. 47	198. 46	213. 34	+18. 37	258
		7	·7594	272. 36	182. 10	196. 58	+17. 28	258
		8	·2726	123. 59	129. 23	144. 11	−18. 18	260
		9	·3740	116. 47	123. 32	138. 20	−21. 49	260
		1760	·9129	83. 35	71. 51	86. 39	−19. 21	261
		1	·9385	84. 3	67. 45	82. 33	−19. 59	261
24	113·515	2	·3983	207. 56	159. 11	145. 39	−18. 9	260
		3	·3518	186. 11	151. 2	137. 30	−21. 57	260
		4	·6383	89. 29	101. 58	88. 26	−19. 8	261
		5	·7340	88. 46	94. 6	80. 34	−20. 37	261
25	114·529	6	·5502	216. 53	171. 24	143. 28	−18. 51	260
		7	·5051	207. 18	166. 7	138. 11	−22. 0	260
		8	·4611	99. 23	117. 1	89. 5	−19. 16	261
		9	·5840	94. 58	108. 4	80. 8	−20. 48	261
26	115·512	1770	·7060	222. 46	185. 3	143. 11	−18. 44	260
		1	·6610	217. 56	180. 31	138. 39	−20. 58	260
		2	·3003	122. 58	131. 57	90. 5	−19. 5	261
		3	·3427	116. 35	128. 35	86. 43	−19. 51	261
		4	·4345	106. 40	121. 22	79. 30	−20. 54	261
28	117·653	5	·9581	227. 9	217. 16	145. 2	−18. 39	260
		6	·4155	208. 50	164. 11	91. 57	−18. 15	261
		7	·3623	198. 53	158. 57	86. 43	−19. 17	261
		8	·3187	177. 33	151. 5	78. 51	−21. 19	261
		9	·4799	95. 4	117. 53	45. 39	−17. 33	262
		1780	·8460	28. 37	93. 57	21. 43	+27. 37	263

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
May 3	122·533	1781	·9496	226. 2	220. 3	78. 36	−20. 20	261
		2	·9373	222. 47	217. 32	76. 5	−23. 15	261
		3	·7139	225. 14	192. 33	51. 6	−17. 29	262
		4	·6421	224. 30	186. 45	45. 18	−16. 41	262
		5	·5249	210. 5	175. 21	33. 54	−21. 20	262
		6	·4374	205. 23	168. 56	27. 29	−20. 5	262
		7	·4219	198. 57	166. 15	24. 48	−21. 34	262
		8	·3203	204. 21	162. 42	21. 15	−15. 57	262
		9	·2961	195. 51	159. 44	18. 17	−16. 49	262
		1790	·5193	347. 22	141. 58	0. 31	+26. 45	264
		1	·5660	356. 58	135. 19	353. 52	+28. 9	264
5	124·508	2	·5862	307. 16	169. 5	359. 37	+27. 14	264
		3	·5613	318. 3	162. 0	352. 32	+28. 31	264
		4	·9285	229. 3	218. 18	48. 50	−17. 38	262
		5	·8970	229. 20	213. 41	44. 13	−17. 4	262
		6	·8205	223. 11	203. 55	34. 27	−21. 8	262
		7	·7448	222. 47	196. 34	27. 6	−19. 57	262
		8	·7126	219. 46	193. 10	23. 42	−21. 21	262
		9	·6782	228. 12	191. 54	22. 26	−15. 1	262
		1800	·6231	225. 2	187. 14	17. 46	−16. 2	262
		1	·5836	206. 15	179. 38	10. 10	−25. 15	262
7	126·591	2	·9890	226. 50	234. 11	35. 10	−20. 31	262
		3	·8147	282. 10	199. 49	0. 48	+25. 37	264
		4	·8054	285. 28	197. 34	358. 33	+27. 35	264
		5	·7490	290. 17	190. 26	351. 25	+28. 8	264
9	128·540	6	·9673	275. 34	225. 52	359. 12	+26. 3	264
		7	·9333	279. 28	217. 57	351. 17	+28. 11	264
10	129·501	8	·3659	99. 39	136. 32	256. 14	−13. 58	265
		9	·4113	98. 16	133. 42	253. 24	−14. 49	265
		1810	·9506	87. 59	83. 32	203. 14	−20. 8	267
13	132·524	1	·5608	100. 23	127. 48	204. 38	−19. 29	267
		2	·7196	94. 13	114. 31	191. 21	−20. 4	267
16	135·577	3	·6205	288. 7	191. 59	225. 30	+20. 45	266
		4	·5931	291. 3	189. 10	222. 41	+21. 4	266
		5	·3449	190. 29	171. 47	205. 18	−19. 25	267
		6	·3100	184. 21	168. 50	202. 21	−18. 35	267
		7	·3512	167. 44	164. 6	197. 37	−22. 35	267
18	137·629	8	·8886	274. 40	222. 21	226. 46	+20. 40	266
		9	·8537	276. 22	217. 43	222. 8	+21. 3	266
		1820	·8427	273. 53	217. 7	221. 32	+18. 41	266
		1	·6564	222. 13	200. 46	205. 11	−19. 25	267
		2	·7127	85. 28	118. 23	122. 48	−12. 27	268
		3	·7440	83. 41	115. 33	119. 58	−11. 34	268
19	138·551	4	·9341	273. 24	230. 14	221. 34	+20. 43	266
		5	·9552	271. 6	234. 30	225. 50	+19. 11	266
		6	·6848	221. 58	203. 40	195. 0	−20. 25	267
		7	·5460	90. 12	132. 13	123. 33	−12. 25	268
		8	·5992	85. 50	127. 56	119. 16	−10. 52	268
		9	·9845	92. 45	84. 10	75. 30	−22. 30	269
		1830	·9697	95. 28	88. 44	80. 4	−24. 55	269
21	140·568	1	·1936	141. 5	161. 53	124. 36	−12. 13	268
		2	·2246	119. 59	157. 7	119. 50	−11. 30	268
		3	·8156	100. 35	114. 34	77. 17	−24. 54	269

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
May 21		1834	·8451	96. 18	110. 22	73. 5	−22. 14	269
23	142·548	5	·4307	227. 59	191. 14	125. 52	−11. 17	268
		6	·3443	222. 59	185. 28	120. 6	−10. 54	268
		7	·5596	117. 27	142. 16	76. 54	−25. 1	269
		8	·5813	109. 22	138. 0	72. 38	−22. 10	269
		9	·6854	103. 22	128. 45	63. 23	−22. 21	269
26	145·572	1840	·9184	244. 7	236. 51	128. 36	− 8. 11	268
		1	·4485	191. 27	184. 10	75. 55	−24. 10	269
		2	·3886	185. 23	179. 49	71. 34	−22. 4	269
		3	·3825	158. 25	168. 46	60. 31	−23. 31	269
		4	·5275	130. 59	152. 23	44. 8	−27. 44	270
		5	·4708	132. 50	155. 36	47. 21	−25. 11	270
		6	·5792	37. 33	140. 37	32. 22	+18. 17	271
		7	·6616	38. 1	134. 54	26. 39	+20. 58	271
		8	·6694	106. 15	133. 30	25. 15	−22. 42	272
		9	·7087	102. 47	129. 25	21. 10	−21. 45	272
29	148·492	1850	·7798	224. 47	220. 49	71. 9	−22. 33	269
		1	·7214	222. 5	214. 55	65. 15	−22. 42	269
		2	·5037	207. 38	195. 21	45. 41	−21. 55	270
		3	·3802	175. 19	178. 3	28. 23	−22. 36	272
		4	·4059	164. 20	173. 36	23. 56	−24. 41	272
		5	·3686	153. 31	169. 18	19. 38	−22. 2	272
		6	·6710	95. 31	133. 17	343. 37	−15. 8	274
		7	·3638	318. 29	182. 34	32. 54	+18. 19	271
		8	·3543	339. 59	174. 36	24. 56	+19. 46	271
30	149·533	9	·8947	228. 49	235. 23	70. 57	−22. 37	269
		1860	·8440	227. 26	228. 53	64. 27	−22. 29	269
		1	·6568	220. 23	210. 13	45. 47	−21. 48	270
		2	·4777	203. 3	193. 11	28. 45	−22. 21	272
		3	·4588	191. 3	187. 30	23. 4	−24. 42	272
		4	·3914	187. 6	183. 45	19. 19	−21. 43	272
		5	·4998	295. 5	197. 32	33. 6	+18. 27	271
		6	·4602	297. 45	194. 35	30. 9	+17. 49	271
		7	·4606	307. 8	191. 21	26. 55	+20. 52	271
		8	·3941	310. 10	187. 32	23. 6	+18. 20	271
31	150·522	9	·9705	230. 52	250. 1	71. 33	−22. 50	269
		1870	·5272	211. 2	199. 29	21. 1	−21. 39	272
		1	·5023	205. 6	195. 58	17. 30	−22. 49	272
		2	·6207	285. 21	209. 4	30. 36	+18. 6	271
		3	·5943	290. 44	205. 39	27. 11	+20. 4	271
		4	·9156	90. 29	109. 52	291. 24	−15. 1	275
June 3	153·547	5	·8835	237. 36	238. 46	17. 23	−15. 48	272
		6	·9348	233. 46	245. 38	24. 15	−20. 16	272
		7	·9206	230. 2	242. 44	21. 21	−23. 20	272
		8	·8928	226. 28	237. 56	16. 33	−25. 42	272
		9	·7064	214. 43	215. 4	353. 41	−27. 33	273
		1880	·4454	111. 48	156. 18	294. 55	−15. 28	275
		1	·5267	100. 12	148. 48	287. 25	−12. 54	275
4	154·575	2	·9840	233. 13	257. 42	21. 45	−22. 15	272
		3	·9706	228. 6	253. 9	17. 12	−26. 52	272
		4	·8426	224. 36	232. 4	356. 7	−25. 55	273
		5	·8273	220. 7	228. 56	352. 59	−28. 53	273
		6	·2937	142. 24	172. 6	296. 9	−15. 41	275

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	II. Long.	II. Lat.	Group.
				° ′	° ′	° ′	° ′	
June 4		1887	·3438	115. 0	163. 15	287. 18	−12. 36	275
6	156·519	8	·4372	218. 6	201. 36	298. 4	−15. 38	275
		9	·3552	209. 57	195. 25	291. 53	−14. 48	275
		1890	·3195	202. 30	192. 0	288. 28	−14. 50	275
		1	·9383	59. 22	112. 13	208. 41	+16. 10	278
7	157·575	2	·6147	229. 45	216. 24	297. 53	−16. 7	275
		3	·5231	227. 4	209. 44	291. 13	−14. 53	275
		4	·4807	224. 41	206. 36	288. 5	−14. 38	275
		5	·8358	57. 40	126. 54	208. 23	+16. 11	278
		6	·8949	57. 44	119. 55	201. 24	+17. 17	278
8	158·550	7	·7650	236. 10	230. 26	298. 6	−15. 50	275
		8	·6480	233. 7	220. 22	288. 2	−15. 9	275
		9	·5148	175. 35	187. 38	255. 18	−30. 9	276
		1900	·5100	171. 48	185. 22	253. 2	−30. 5	276
		1	·6971	54. 16	141. 8	208. 48	+16. 8	278
9	159·557	2	·8842	240. 5	244. 23	297. 46	−15. 23	275
		3	·7877	238. 1	233. 43	287. 6	−15. 9	275
		4	·5312	47. 42	155. 22	208. 45	+15. 50	278
12	162·508	5	·8807	90. 45	125. 42	137. 13	− 9. 51	281
13	163·515	6	·7495	93. 10	140. 6	137. 20	− 9. 32	281
14	164·517	7	·9555	262. 39	261. 5	244. 6	+ 2. 55	277
		8	·4041	290. 58	209. 11	192. 12	+12. 58	278
		9	·5872	97. 54	154. 7	137. 8	− 9. 31	281
15	165·519	1910	·6078	231. 47	222. 59	191. 48	−15. 51	279
		1	·6559	280. 28	228. 38	197. 27	+13. 54	278
		2	·5772	281. 23	222. 49	191. 38	+12. 53	278
		3	·4000	107. 15	168. 19	137. 8	− 9. 17	281
16	166·527	4	·7300	237. 24	234. 21	188. 52	−15. 52	279
		5	·8235	277. 23	244. 42	199. 13	+14. 20	278
		6	·7336	277. 35	236. 19	190. 50	+13. 6	278
		7	·2225	134. 7	182. 42	137. 13	− 8. 57	281
19	169·528	8	·5620	243. 40	225. 43	137. 40	− 8. 48	281
		9	·6405	287. 4	230. 26	142. 23	+16. 56	280
		1920	·9190	62. 21	127. 28	39. 25	+18. 45	285
		1	·9595	60. 11	120. 26	32. 23	+21. 28	285
21	171·566	2	·8673	251. 35	254. 17	137. 19	− 8. 54	281
		3	·7206	231. 44	236. 5	119. 7	−20. 29	282
		4	·3137	348. 43	196. 34	79. 36	+20. 2	283
		5	·6559	56. 46	157. 1	40. 3	+18. 17	285
		6	·7723	57. 22	147. 13	30. 15	+20. 44	285
		7	·8555	98. 48	137. 55	20. 57	−12. 25	286
22	172·535	8	·9546	253. 30	267. 55	137. 12	− 8. 51	281
		9	·8394	237. 1	249. 20	118. 37	−20. 41	282
		1930	·4961	48. 5	170. 56	40. 13	+18. 25	285
		1	·6353	52. 42	160. 33	29. 50	+20. 30	285
		2	·8891	58. 40	135. 9	4. 26	+22. 49	288
		3	·7226	102. 46	151. 58	21. 15	−12. 22	286
		4	·8882	114. 49	138. 23	7. 40	−26. 26	287
		5	·8766	105. 2	137. 25	6. 42	−17. 45	287
23	173·501	6	·4947	152. 11	185. 22	40. 57	−25. 11	284
		7	·3481	29. 19	184. 44	40. 19	+18. 27	285
		8	·4282	29. 17	181. 29	37. 4	+22. 22	285
		9	·4910	40. 23	174. 33	30. 8	+21. 37	285

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
June 23		1940	·7876	120. 32	152. 14	7. 49	−26. 29	287
		1	·8227	117. 2	147. 31	3. 6	−25. 19	287
		2	·8141	110. 40	146. 27	2. 2	−20. 8	287
25	175·666	3	·5321	211. 13	219. 0	43. 53	−23. 3	284
		4	·5369	206. 13	216. 55	41. 48	−24. 56	284
		5	·3837	211. 8	212. 37	37. 30	−15. 39	286
		6	·3979	314. 39	214. 49	39. 42	+19. 53	285
		7	·5699	148. 55	182. 38	7. 31	−28. 27	287
		8	·5674	143. 34	179. 51	4. 44	−26. 40	287
		9	·5722	138. 36	177. 10	2. 3	−25. 11	287
26	176·547	1950	·6433	224. 12	231. 30	43. 54	−22. 49	284
		1	·6379	219. 37	229. 12	41. 36	−24. 54	284
		2	·5270	166. 41	194. 45	7. 9	−28. 50	287
		3	·5144	154. 11	188. 1	0. 25	−26. 10	287
		4	·5797	140. 53	178. 34	350. 58	−26. 12	289
		5	·9504	100. 36	129. 28	301. 52	−13. 44	291
27	177·617	6	·7807	233. 37	246. 29	43. 41	−22. 40	284
		7	·7632	229. 27	243. 26	40. 38	−24. 53	284
		8	·4938	164. 5	194. 31	351. 43	−26. 15	289
		9	·5257	156. 14	189. 34	346. 46	−27. 4	289
		1960	·8612	103. 26	143. 27	300. 39	−13. 47	291
		1	·9869	102. 11	121. 32	278. 44	−15. 46	292
		2	·9828	108. 44	123. 42	280. 54	−22. 2	292
29	179·508	3	·7822	245. 8	251. 19	21. 43	−14. 45	286
		4	·6650	219. 12	232. 50	3. 14	−26. 48	287
		5	·5614	206. 46	220. 56	351. 20	−26. 17	289
		6	·5350	198. 15	215. 25	345. 49	−26. 59	289
		7	·8476	288. 33	259. 14	29. 38	+19. 59	285
		8	·5974	115. 11	170. 2	300. 26	−14. 13	291
		9	·8574	114. 36	148. 4	278. 28	−22. 6	292
		1970	·8502	107. 7	147. 3	277. 27	−15. 45	292
		1	·9299	109. 4	137. 2	267. 26	−19. 40	292
30	180·607	2	·7546	227. 47	244. 12	359. 0	−26. 16	289
		3	·6766	222. 13	235. 49	350. 37	−25. 58	289
		4	·6321	216. 1	230. 1	344. 49	−26. 45	289
		5	·4193	131. 13	185. 42	300. 30	−14. 9	291
		6	·6990	112. 45	163. 4	277. 52	−15. 23	292
		7	·7291	121. 12	163. 17	278. 5	−21. 52	292
		8	·8261	113. 9	151. 59	266. 47	−19. 27	292
		9	·9421	100. 33	134. 39	249. 27	−11. 38	293
July 1	181·663	1980	·7539	226. 35	244. 22	344. 11	−27. 14	289
		1	·7540	187. 47	215. 32	315. 21	−44. 46	290
		2	·3058	163. 17	200. 16	300. 5	−14. 10	291
		3	·5978	131. 57	177. 24	277. 13	−21. 57	292
		4	·5301	122. 41	178. 9	277. 58	−15. 0	292
		5	·7016	119. 52	165. 51	265. 40	−19. 37	292
		6	·8570	103. 58	147. 37	247. 26	−12. 21	293
2	182·678	7	·8566	233. 10	257. 49	343. 14	−27. 21	289
		8	·7986	201. 16	231. 42	317. 7	−44. 15	290
		9	·7910	198. 23	228. 27	313. 52	−44. 50	290
		1990	·3343	205. 28	214. 47	300. 12	−14. 6	291
		1	·4795	149. 20	191. 23	276. 48	−21. 45	292
		2	·3724	144. 30	193. 26	278. 51	−14. 58	292

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
July 2		1993	·3996	139. 55	190. 56	276. 21	−15. 14	292
		4	·5224	133. 8	182. 51	268. 16	−18. 46	292
		5	·5469	131. 23	180. 53	266. 18	−19. 8	292
		6	·8184	113. 22	154. 36	240. 1	−18. 30	293
		7	·7234	108. 52	162. 0	247. 25	−12. 37	293
4	184·527	8	·9799	240. 11	282. 22	341. 34	−27. 13	289
		9	·8996	215. 27	255. 27	314. 39	−43. 59	290
		2000	·8836	212. 30	250. 59	310. 11	−44. 53	290
		1	·6110	240. 58	241. 4	300. 16	−13. 48	291
		2	·4559	200. 32	217. 49	277. 1	−21. 42	292
		3	·3500	203. 58	216. 14	275. 26	−15. 7	292
		4	·3919	178. 43	207. 22	266. 34	−19. 39	292
		5	·5266	138. 16	186. 4	245. 16	−20. 23	293
		6	·5865	131. 13	180. 1	239. 13	−20. 14	293
		7	·4191	128. 28	188. 13	247. 25	−12. 18	293
		8	·9761	111. 12	132. 28	191. 40	−20. 55	295
		9	·9509	105. 7	137. 15	196. 27	−14. 18	295
6	186·487	2010	·8780	251. 38	268. 24	299. 47	−14. 2	291
		1	·6932	233. 20	245. 57	277. 20	−21. 25	292
		2	·4204	193. 17	215. 17	246. 40	−20. 31	293
		3	·2915	202. 4	215. 45	247. 8	−12. 5	293
		4	·4027	174. 8	206. 54	238. 17	−20. 0	293
		5	·8189	118. 10	159. 9	190. 32	−20. 38	295
		6	·7462	113. 17	164. 25	195. 48	−14. 47	295
		7	·8235	111. 45	156. 58	188. 21	−15. 47	295
		8	·8858	120. 22	152. 19	183. 42	−24. 51	295
8	188·651	9	·9260	245. 51	275. 31	276. 13	−21. 19	292
		2020	·6715	233. 13	245. 59	246. 41	−21. 0	293
		1	·5887	223. 35	236. 50	237. 32	−22. 7	293
		2	·5446	139. 56	189. 3	189. 45	−20. 47	295
		3	·6538	137. 48	181. 57	182. 39	−25. 14	295
		4	·4317	138. 56	194. 5	194. 47	−15. 7	295
		5	·5091	127. 4	186. 26	187. 8	−14. 5	295
		6	·8486	125. 55	160. 29	161. 11	−26. 51	296
		7	·8800	115. 28	153. 30	154. 12	−19. 35	296
		8	·9146	111. 55	147. 49	148. 31	−17. 39	296
		9	·9549	102. 20	139. 52	140. 34	− 9. 52	297
11	191·475	2030	·9653	248. 39	285. 47	246. 25	−21. 18	293
		1	·4853	209. 53	228. 4	188. 42	−21. 24	295
		2	·4726	232. 1	235. 50	196. 28	−13. 53	295
		3	·4088	221. 6	229. 24	190. 2	−14. 33	295
		4	·3683	188. 9	216. 23	177. 1	−17. 22	295
		5	·5579	161. 16	201. 12	161. 50	−27. 23	296
		6	·5020	144. 24	195. 8	155. 46	−19. 32	296
		7	·6020	114. 5	179. 42	140. 20	− 9. 42	297
		8	·7338	117. 39	170. 50	131. 28	−15. 31	297
		9	·7818	116. 26	166. 23	127. 1	−16. 6	297
12	192·549	2040	·8358	286. 25	271. 31	216. 55	+13. 52	294
		1	·6115	228. 1	242. 56	188. 20	−21. 38	295
		2	·6236	242. 3	248. 43	194. 7	−14. 56	295
		3	·5638	239. 33	244. 8	189. 32	−14. 11	295
		4	·4718	222. 8	233. 21	178. 45	−17. 18	295
		5	·4375	214. 7	228. 56	174. 20	−17. 47	295

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
July 12		2046	.5282	187. 3	217. 44	163. 8	−27. 31	296
		7	·4129	169. 58	209. 37	155. 1	−19. 33	296
		8	·4155	127. 40	194. 58	140. 22	− 9. 54	297
		9	·5637	128. 48	186. 59	132. 23	−15. 46	297
		2050	·6301	125. 33	181. 44	127. 8	−16. 35	297
14	194·512	1	·8533	244. 36	270. 18	187. 51	−21. 40	295
		2	·8503	253. 41	272. 23	189. 56	−14. 12	295
		3	·7230	241. 29	257. 17	174. 50	−19. 8	295
		4	·6611	223. 27	245. 12	162. 45	−26. 30	296
		5	·5127	221. 22	236. 25	153. 58	−19. 41	296
		6	·2661	207. 7	223. 8	140. 41	− 9. 45	297
		7	·3762	162. 51	209. 3	126. 36	−16. 16	297
15	195·520	8	·9429	257. 6	286. 16	189. 32	−14. 9	295
		9	·9393	248. 51	283. 58	187. 14	−21. 37	295
		2060	·7550	231. 59	256. 46	160. 2	−26. 45	296
		1	·6486	235. 33	250. 32	153. 48	−19. 55	296
		2	·4112	237. 10	237. 21	140. 37	−10. 0	297
		3	·9750	74. 3	140. 12	43. 28	+20. 16	299
17	197·521	4	·9395	243. 44	284. 14	159. 7	−26. 58	296
		5	·8920	249. 19	278. 41	153. 34	−20. 8	296
		6	·7476	257. 11	265. 56	140. 49	− 9. 49	297
		7	·7862	72. 41	169. 7	44. 0	+20. 4	299
		8	·8875	75. 5	157. 32	32. 25	+19. 31	299
20	200·485	9	·4347	178. 35	219. 11	52. 1	−20. 34	298
		2070	·3310	44. 11	210. 7	42. 57	+19. 47	299
		1	·4361	60. 24	200. 40	33. 30	+19. 11	299
		2	·4695	63. 22	198. 0	30. 50	+19. 3	299
		3	·7911	132. 4	178. 14	11. 4	−24. 13	300
25	205·493	4	·7990	299. 53	279. 35	41. 23	+20. 26	299
		5	·7015	300. 1	270. 44	32. 32	+18. 58	299
		6	·6162	228. 5	252. 48	14. 36	−23. 20	300
		7	·3762	177. 19	223. 11	344. 59	−16. 19	301
		8	·3900	168. 26	219. 33	341. 21	−16. 12	301
		9	·8931	128. 50	170. 10	291. 58	−24. 15	302
Aug. 1	212·473	2080	·5592	237. 6	258. 57	281. 45	−17. 29	303
		1	·4838	230. 14	252. 35	275. 23	−16. 25	303
		2	·4871	170. 12	223. 25	246. 13	−21. 15	304
4	215·468	3	·6322	236. 39	265. 15	245. 34	−21. 28	304
		4	·5359	146. 33	213. 30	193. 49	−16. 24	306
		5	·5927	143. 15	209. 7	189. 26	−17. 31	306
7	218·504	6	·9455	258. 9	306. 23	243. 38	−21. 22	304
		7	·4823	228. 9	256. 33	193. 48	−17. 18	306
		8	·4384	217. 7	250. 30	187. 45	−17. 28	306
		9	·4637	198. 17	242. 19	179. 34	−21. 11	306
		2090	·3738	308. 23	260. 18	197. 33	+14. 53	305
		1	·3201	313. 37	256. 27	193. 42	+15. 12	305
8	219·513	2	·6292	244. 54	271. 42	194. 38	−17. 49	306
		3	·5566	237. 25	264. 35	187. 31	−17. 56	306
		4	·5318	224. 7	257. 33	180. 29	−21. 12	306
		5	·5151	218. 30	254. 13	177. 9	−21. 41	306
		6	·4472	225. 4	254. 48	177. 44	−16. 17	306
		7	·6063	298. 34	277. 50	200. 46	+13. 55	305
		8	·4993	305. 22	269. 36	192. 32	+16. 5	305

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Aug. 15	226·475	2099	·6225	217. 27	262. 26	86. 36	−28. 56	307
		2100	·4345	59. 8	228. 38	52. 48	+22. 46	310
		1	·5467	82. 19	215. 55	40. 5	+18. 25	310
		2	·6688	77. 34	207. 50	32. 0	+23. 48	310
		3	·7421	80. 51	200. 57	25. 7	+23. 6	310
19	230·597	4	·7416	277. 11	298. 18	64. 1	− 3. 1	308
		5	·8131	236. 44	289. 33	55. 16	−33. 43	309
		6	·7826	229. 45	282. 17	48. 0	−35. 35	309
		7	·3461	168. 45	241. 49	7. 32	−10. 52	311
		8	·2291	130. 10	239. 24	5. 7	+ 1. 38	312
		9	·4160	315. 53	274. 4	39. 47	+17. 38	310
		2110	·3471	328. 55	267. 34	33. 17	+19. 44	310
		1	·3015	357. 32	257. 59	23. 42	+23. 8	310
		2	·7442	81. 50	204. 45	330. 28	+23. 33	313
22	233·567	3	·9559	248. 7	317. 27	41. 2	−35. 20	309
		4	·9923	254. 2	331. 3	54. 38	−32. 49	309
		5	·8774	304. 25	316. 16	39. 51	+17. 14	310
		6	·8056	307. 54	308. 1	31. 36	+19. 39	310
		7	·7329	314. 11	300. 16	23. 51	+23. 21	310
		8	·8646	314. 46	313. 54	37. 29	+26. 5	310
		9	·8791	132. 56	197. 31	281. 6	−17. 36	315
		2120	·9784	129. 40	179. 53	263. 28	−18. 57	315
23	234·697	1	·9946	251. 54	332. 43	40. 16	−35. 27	309
		2	·9772	303. 57	334. 27	42. 0	+16. 10	310
		3	·9612	306. 7	330. 38	38. 11	+18. 27	310
		4	·9022	312. 41	320. 19	27. 52	+24. 26	310
		5	·7457	140. 23	213. 49	281. 22	−17. 46	315
		6	·8546	136. 34	202. 26	269. 59	−19. 18	315
		7	·9036	133. 41	195. 39	263. 12	−18. 53	315
		8	·6583	92. 40	214. 38	282. 11	+15. 50	314
		9	·6895	93. 28	212. 4	279. 37	+15. 36	314
26	237·571	2130	·4179	187. 50	253. 12	280. 0	−17. 2	315
		1	·4976	172. 23	244. 23	271. 11	−19. 20	315
		2	·5968	164. 54	236. 45	263. 33	−22. 44	315
		3	·5919	157. 22	233. 25	260. 13	−19. 31	315
		4	·8017	143. 45	212. 50	239. 38	−21. 47	316
		5	·9493	129. 14	190. 0	216. 48	−16. 1	317
		6	·9695	97. 56	181. 35	208. 23	+13. 5	318
		7	·2180	12. 21	260. 1	286. 49	+19. 27	314
		8	·1917	19. 37	258. 21	285. 9	+18. 1	314
Sept. 5	247·533	9	·7969	303. 40	321. 15	206. 44	+13. 24	318
		2140	·6141	261. 46	300. 41	186. 10	−12. 5	319
		1	·5755	251. 3	294. 41	180. 10	−15. 49	319
		2	·4581	225. 41	279. 2	164. 31	−17. 43	320
		3	·4473	217. 37	275. 11	160. 30	−18. 20	320
		4	·4345	203. 1	268. 23	153. 52	−18. 28	320
		5	·5705	182. 42	255. 54	141. 23	−25. 23	321
		6	·3103	86. 45	251. 19	136. 48	+14. 31	322
8	250·562	7	·9782	276. 58	346. 27	188. 58	−13. 53	319
		8	·9347	276. 12	337. 25	179. 56	−12. 48	319
		9	·8256	264. 42	320. 53	163. 24	−18. 24	320
		2150	·7124	257. 12	308. 33	151. 4	−18. 53	320
		1	·6891	242. 49	300. 15	142. 46	−25. 36	321

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Sept. 8		2152	·6538	239. 15	296. 16	138. 47	−25. 13	321
		3	·4264	194. 20	267. 12	109. 43	−17. 40	323
		4	·4598	183. 24	261. 44	104. 15	−18. 30	323
		5	·6198	159. 22	244. 3	86. 34	−20. 14	324
		6	·6636	156. 23	240. 5	82. 36	−20. 57	324
		7	·9666	151. 3	204. 41	47. 12	−33. 58	327
12	254·503	8	·8340	267. 47	326. 21	112. 58	−16. 59	323
		9	·7706	259. 37	317. 37	104. 14	−20. 21	323
		2160	·6118	248. 3	301. 45	88. 22	−19. 31	324
		1	·5784	233. 16	292. 55	79. 32	−23. 19	324
		2	·7047	181. 42	256. 23	43. 0	−33. 54	327
		3	·7508	170. 46	245. 56	32. 33	−32. 44	327
		4	·4665	180. 16	263. 39	50. 16	−18. 14	326
		5	·9113	133. 0	212. 32	359. 9	−14. 16	330
		6	·9465	131. 40	206. 43	353. 20	−14. 23	330
		7	·4516	71. 57	253. 19	39. 56	+24. 6	328
		8	·5568	75. 23	245. 49	32. 26	+26. 24	328
		9	·6040	79. 33	241. 19	27. 56	+25. 45	328
15	257·572	2170	·7599	325. 4	325. 14	68. 19	+27. 46	325
		1	·7143	331. 27	319. 17	62. 22	+30. 56	325
		2	·4144	339. 2	296. 33	39. 38	+23. 38	328
		3	·3736	357. 41	288. 36	31. 41	+26. 25	328
		4	·7032	226. 51	296. 46	39. 51	−33. 38	327
		5	·6730	213. 51	285. 41	28. 46	−34. 22	327
		6	·5048	159. 5	256. 19	359. 24	−14. 11	330
		7	·7418	182. 57	258. 15	1. 20	−36. 54	329
		8	·9450	145. 18	213. 35	316. 40	−26. 13	331
24	266·375	9	·8593	262. 34	338. 20	316. 33	−23. 38	331
		2180	·7985	252. 51	327. 56	306. 9	−27. 36	331
		1	·5112	213. 43	291. 7	269. 20	−23. 25	332
		2	·4462	209. 34	288. 29	266. 42	−19. 27	332
		3	·6329	196. 8	279. 39	257. 52	−31. 40	332
		4	·9538	133. 14	216. 58	195. 11	−14. 34	333
26	268·558	5	·6444	253. 45	319. 10	266. 26	−19. 37	332
		6	·7283	143. 24	247. 4	194. 20	−14. 41	333
		7	·7920	135. 44	239. 33	186. 49	−11. 18	333
		8	·8369	138. 46	236. 2	183. 18	−15. 2	333
		9	·9776	138. 2	214. 38	161. 54	−20. 2	234
		2190	·9650	135. 55	217. 18	164. 34	−17. 23	334
Oct. 1	273·419	1	·4839	247. 39	312. 51	191. 10	−14. 57	333
		2	·3925	242. 24	307. 12	185. 31	−11. 59	333
		3	·3524	225. 50	300. 30	178. 49	−12. 46	333
		4	·5205	96. 59	262. 59	141. 18	+15. 28	335
		5	·8536	140. 28	239. 24	117. 43	−16. 47	337
	273·430	6	·4219	189. 11	286. 11	164. 20	−17. 11	334
		7	·3882	179. 59	283. 26	161. 35	−13. 50	334
		8	·4706	183. 26	282. 30	160. 39	−19. 10	334
		9	·5052	177. 4	278. 30	156. 39	−19. 45	334
		2200	·5742	162. 4	268. 46	146. 55	−18. 20	334
		1	·6934	164. 43	263. 5	141. 14	−25. 36	336
		2	·8556	140. 13	239. 7	117. 16	−16. 40	337
		3	·9334	140. 28	229. 1	107. 10	−19. 53	337
		4	·8559	138. 30	238. 37	116. 46	−15. 16	337

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Oct. 3	275·435	2205	·5047	253. 13	317. 48	167. 31	−14. 5	334
		6	·5058	244. 29	314. 35	164. 18	−17. 12	334
		7	·4397	239. 53	310. 5	159. 48	−15. 7	334
		8	·5035	236. 36	311. 7	160. 50	−19. 24	334
		9	·4741	230. 23	307. 20	157. 3	−19. 11	334
		2210	·4540	217. 29	300. 55	150. 38	−19. 53	334
		1	·4194	209. 51	297. 7	146. 50	−18. 10	334
		2	·5414	197. 41	290. 25	140. 8	−25. 47	336
	275·450	3	·7935	272. 3	343. 48	193. 18	−14. 39	333
		4	·7249	268. 45	337. 3	186. 33	−14. 41	333
		5	·6310	266. 43	329. 39	179. 9	−12. 43	333
		6	·1753	51. 6	291. 10	140. 40	+15. 34	335
		7	·5776	158. 23	269. 3	118. 33	−16. 56	337
		8	·5917	153. 42	266. 31	116. 1	−15. 23	337
		9	·7375	149. 40	255. 5	104. 35	−19. 2	337
10	282·449	2220	·9348	275. 19	8. 13	118. 26	−17. 13	337
		1	·7075	329. 22	344. 9	94. 22	+27. 9	338
		2	·6214	332. 59	336. 18	86. 31	+26. 44	338
		3	·6432	336. 59	336. 34	86. 47	+29. 43	338
		4	·4599	239. 39	317. 41	67. 54	−16. 41	339
		5	·4545	213. 20	305. 50	56. 3	−20. 39	339
		6	·4561	193. 59	296. 30	46. 43	−20. 18	339
		7	·4598	184. 3	291. 52	42. 5	−19. 6	339
		8	·3831	182. 53	293. 26	43. 39	−14. 29	339
		9	·4371	175. 11	288. 55	39. 8	−15. 58	339
		2230	·8715	93. 7	242. 9	352. 22	+23. 11	341
		1	·9334	92. 35	233. 7	343. 20	+24. 22	341
17	289·603	2	·5587	330. 50	339. 29	348. 14	+23. 16	341
		3	·4763	335. 28	333. 2	341. 47	+22. 34	341
		4	·4683	351. 33	327. 2	335. 47	+27. 51	341
		5	·7623	252. 55	348. 2	356. 47	−27. 7	340
		6	·7605	242. 0	341. 39	350. 24	−33. 19	340
		7	·7277	235. 5	334. 44	343. 29	−34. 27	340
		8	·3320	166. 59	297. 22	306. 7	− 9. 26	344
		9	·4853	177. 34	295. 21	304. 6	−19. 45	345
		2240	·5874	170. 41	287. 52	296. 37	−23. 20	345
21	293·476	1	·9735	319. 3	31. 0	344. 49	+23. 41	341
		2	·7320	265. 10	354. 43	308. 32	−18. 2	345
		3	·6677	256. 53	346. 56	300. 45	−20. 27	345
		4	·6429	248. 36	341. 43	295. 32	−23. 32	345
		5	·3852	221. 28	319. 36	273. 25	−16. 30	346
		6	·3778	212. 12	315. 55	269. 44	−16. 45	346
		7	·4706	193. 7	307. 1	260. 50	−22. 1	346
		8	·6340	180. 36	295. 18	249. 7	−29. 53	347
		9	·6330	174. 29	291. 38	245. 27	−27. 44	347
		2250	·6170	91. 29	277. 10	230. 59	+18. 58	348
		1	·6762	93. 1	272. 22	226. 11	+19. 10	348
29	301·374	2	·8580	265. 34	14. 59	216. 46	−22. 16	349
		3	·5949	260. 28	351. 48	193. 35	−15. 47	350
		4	·4899	250. 8	342. 24	184. 11	−15. 57	350
		5	·3246	222. 50	327. 10	168. 57	−13. 27	351
		6	·3797	196. 42	318. 2	159. 49	−17. 29	351
		7	·2197	31. 12	319. 55	161. 42	+17. 3	352

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Oct. 29		2258	·7842	99. 2	270. 8	111. 55	+15. 16	353
		9	·8589	95. 4	262. 42	104. 29	+19. 23	353
31	303·487	2260	·8707	273. 55	20. 57	192. 46	−15. 40	350
		1	·8423	272. 50	17. 33	189. 22	−15. 45	350
		2	·6156	249. 36	351. 17	163. 6	−21. 58	351
		3	·5453	252. 2	348. 14	160. 3	−17. 43	351
		4	·4825	324. 16	349. 26	161. 15	+17. 35	352
		5	·4081	86. 31	301. 40	113. 29	+15. 2	353
		6	·5748	84. 51	291. 29	103. 18	+20. 12	353
Nov. 7	310·482	7	·9562	308. 6	43. 30	116. 6	+15. 8	353
		8	·9274	309. 33	38. 18	110. 54	+16. 20	353
		9	·5255	152. 35	305. 28	18. 4	−16. 8	355
		2270	·5927	148. 9	300. 2	12. 38	−16. 38	355
		1	·7148	136. 27	288. 3	0. 39	−13. 37	355
		2	·7657	134. 41	283. 23	355. 59	−13. 43	355
		3	·3947	51. 6	318. 54	31. 30	+23. 50	354
		4	·9048	89. 0	266. 41	339. 17	+23. 28	357
11	314·613	5	·5996	260. 32	6. 24	20. 24	−15. 45	355
		6	·4920	250. 9	356. 47	10. 47	−16. 22	355
		7	·3813	243. 59	349. 36	3. 36	−13. 30	355
		8	·2927	227. 52	341. 57	355. 57	−12. 11	355
		9	·5184	216. 27	342. 41	356. 41	−27. 0	356
		2280	·5189	210. 47	339. 28	353. 28	−27. 40	356
		1	·3937	50. 14	323. 4	337. 4	+23. 18	357
		2	·8035	142. 27	286. 20	300. 20	−21. 38	358
		3	·9131	140. 58	273. 4	287. 4	−24. 25	358
		4	·9009	74. 39	274. 23	288. 23	+34. 58	359
12	315·468	5	·7238	267. 26	18. 14	20. 6	−15. 23	355
		6	·6152	261. 30	8. 39	10. 31	−15. 43	355
		7	·5150	258. 48	1. 36	3. 28	−13. 42	355
		8	·4110	253. 2	354. 23	356. 15	−12. 8	335
		9	·5743	232. 46	354. 27	356. 19	−26. 40	356
		2290	·3491	23. 34	334. 54	336. 46	+23. 19	557
		1	·6759	148. 12	299. 46	301. 38	−20. 56	358
21	324·502	2	·9177	252. 23	44. 37	278. 21	−32. 38	360
		3	·8208	328. 38	33. 16	267. 0	+32. 22	361
		4	·6600	228. 24	6. 50	240. 34	−33. 23	362
		5	·3988	153. 5	327. 11	200. 55	−14. 5	363
28	331·605	6	·9057	270. 9	55. 3	188. 2	−14. 46	363
		7	·7480	253. 7	34. 11	167. 10	−23. 50	364
		8	·3656	28. 19	347. 14	120. 13	+21. 58	365
		9	·3882	37. 50	343. 6	116. 5	+22. 14	365
		2300	·3032	49. 46	341. 52	114. 51	+15. 45	365
		1	·2815	171. 10	344. 24	117. 23	−13. 34	366
		2	·4706	150. 33	330. 42	103. 41	−17. 50	366
		3	·5671	145. 5	323. 28	96. 27	−19. 26	366
		4	·7361	137. 20	308. 54	81. 53	−20. 56	367
		5	·8503	136. 7	297. 33	70. 32	−23. 43	367
Dec. 5	338·494	6	·9652	265. 48	72. 16	107. 32	−17. 48	366
		7	·8728	262. 51	57. 16	92. 32	−18. 31	366
		8	·7814	257. 15	46. 24	81. 40	−20. 39	367
		9	·7090	248. 44	37. 35	72. 51	−24. 9	367
		2310	·6610	246. 3	33. 0	68. 16	−23. 57	367

1858.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Dec. 5		2311	·4450	359. 7	5. 58	41. 14	+25. 30	369
		2	·4605	219. 32	10. 56	46. 12	−24. 20	368
		3	·2707	179. 44	354. 31	29. 47	−14. 56	370
		4	·3499	157. 0	345. 52	21. 8	−15. 54	370
		5	·4169	147. 31	340. 10	15. 26	−16. 19	370
		6	·5008	142. 55	334. 22	9. 38	−17. 57	370
		7	·5546	138. 32	329. 51	5. 7	−17. 56	370
19	352·526	8	·9282	311. 26	76. 0	272. 13	+29. 53	371
		9	·5127	307. 49	39. 50	236. 3	+13. 15	372
		2320	·4090	332. 12	27. 15	223. 28	+17. 43	372
		1	·2820	217. 20	20. 55	217. 8	−15. 45	373
		2	·2500	175. 20	9. 27	205. 40	−15. 38	373
		3	·2971	156. 19	3. 23	199. 36	−16. 7	373
		4	·3652	152. 45	359. 53	196. 6	−18. 48	373
		5	·6351	117. 52	334. 57	171. 10	−13. 36	374
		6	·7253	122. 11	328. 41	164. 54	−18. 17	374
22	355·466	7	·9235	291. 53	81. 44	236. 15	+13. 9	372
		8	·8170	294. 52	68. 29	223. 0	+13. 31	372
		9	·7858	304. 6	63. 23	217. 54	+19. 48	372
		2330	·7433	257. 6	62. 11	216. 42	−15. 46	373
		1	·6294	253. 24	52. 29	207. 0	−15. 57	373
		2	·5239	245. 33	43. 36	198. 7	−17. 24	373
		3	·2095	182. 58	14. 54	169. 25	−13. 57	374
		4	·2971	166. 22	9. 29	164. 0	−18. 2	374
		5	·8672	116. 51	316. 51	111. 22	−18. 20	376
		6	·9793	113. 27	297. 36	92. 7	−16. 45	378
26	359·597	7	·7084	309. 16	58. 38	154. 34	+21. 41	375
		8	·6615	316. 19	52. 31	148. 27	+23. 53	375
		9	·7607	251. 22	67. 21	163. 17	−19. 10	374
		2340	·2770	166. 54	14. 48	110. 44	−17. 40	376
		1	·4826	126. 48	354. 40	90. 36	−17. 0	378
27	360·602	2	·8201	304. 25	70. 55	152. 35	+22. 37	375
		3	·7839	308. 2	66. 13	147. 53	+23. 58	375
		4	·8756	253. 31	80. 52	162. 32	−19. 19	374
		5	·2879	211. 50	28. 53	110. 33	−17. 16	376
		6	·3214	144. 54	8. 40	90. 20	−16. 50	378
		7	·4938	173. 31	14. 44	96. 24	−31. 27	377
		8	·5145	167. 40	10. 58	92. 38	−31. 56	377
		9	·9562	68. 35	311. 2	32. 42	+23. 35	382
Jan. 2	1·521	2350	·9890	253. 49	108. 45	106. 28	−17. 51	376
1859.		1	·9045	254. 3	91. 14	88. 57	−17. 1	378
		2	·4291	194. 54	33. 23	31. 6	−27. 47	380
		3	·2996	210. 24	35. 40	33. 23	−18. 20	381
		4	·2665	181. 3	26. 49	24. 32	−18. 38	381
		5	·2769	143. 23	16. 45	14. 28	−15. 45	381
		6	·8649	117. 19	328. 49	326. 32	−23. 55	383
		7	·6672	313. 1	59. 43	57. 26	+23. 29	379
		8	·5639	320. 56	50. 6	47. 49	+22. 19	379
		9	·5123	334. 2	41. 45	39. 28	+23. 48	382
		2360	·4921	346. 23	34. 57	32. 40	+25. 2	382
		1	·5015	358. 29	28. 31	26. 14	+26. 40	382
		2	·4811	4. 42	25. 9	22. 52	+25. 19	382
9	8·504	3	·6175	27. 27	13. 50	272. 30	+28. 37	385

1859.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Jan. 9		2364	·2800	175. 31	33. 16	291. 56	−20. 11	384
		5	·8948	66. 40	333. 34	232. 14	+16. 59	387
		6	·8240	70. 4	340. 51	239. 31	+12. 15	387
		7	·9325	69. 57	327. 28	226. 8	+15. 11	387
		8	·4742	131. 4	12. 4	270. 44	−22. 33	386
		9	·5331	129. 14	8. 4	266. 44	−24. 7	386
		2370	·6159	113. 42	358. 17	256. 57	−18. 44	386
		1	·6726	110. 54	353. 28	252. 8	−18. 12	386
		2	·7174	110. 55	349. 50	248. 30	−19. 5	386
		3	·9650	99. 54	318. 58	217. 38	−12. 33	389
		4	·9866	103. 45	312. 54	211. 34	−16. 12	389
14	13·467	5	·7915	305. 23	81. 58	270. 14	+27. 3	385
		6	·7706	312. 22	76. 42	264. 58	+30. 29	385
		7	·3441	317. 40	51. 27	239. 43	+11. 15	387
		8	·3769	342. 22	44. 12	232. 28	+16. 55	387
		9	·7145	239. 5	82. 24	270. 40	−21. 52	386
		2380	·5778	239. 11	72. 0	260. 16	−18. 40	386
		1	·4436	222. 37	59. 24	247. 40	−21. 47	386
		2	·4225	161. 22	32. 16	220. 32	−28. 34	388
		3	·2335	125. 39	28. 31	216. 47	−13. 3	389
		4	·3104	124. 13	24. 32	212. 48	−15. 30	389
16	15·564	5	·9522	243. 30	113. 37	272. 8	−21. 32	386
		6	·8711	246. 2	101. 27	259. 58	−18. 29	386
		7	·7630	241. 11	89. 28	247. 59	−20. 48	386
		8	·9421	299. 5	104. 56	263. 27	+30. 9	385
		9	·9577	294. 19	109. 30	268. 1	+26. 37	385
		2390	·6805	286. 6	81. 8	239. 39	+10. 46	387
		1	·6265	299. 28	73. 33	232. 4	+16. 55	387
		2	·5465	317. 48	61. 41	220. 12	+21. 25	387
		3	·4288	232. 34	63. 28	221. 59	−17. 29	389
		4	·3172	237. 34	55. 56	214. 27	−12. 48	389
		5	·2779	220. 23	53. 3	211. 34	−15. 46	389
		6	·3285	144. 7	30. 55	189. 26	−21. 1	390
		7	·8324	100. 46	345. 6	143. 37	−16. 1	391
		8	·8861	59. 34	342. 57	141. 28	+19. 33	392
20	19·508	9	·9903	280. 12	125. 0	227. 35	+16. 22	387
		2400	·9754	245. 30	123. 9	225. 44	−17. 59	389
		1	·9183	244. 54	112. 0	214. 35	−18. 26	389
		2	·9216	250. 26	112. 38	215. 13	−13. 23	389
		3	·5790	37. 53	19. 31	122. 6	+19. 27	392
		4	·2118	148. 6	39. 55	142. 30	−16. 7	391
		5	·7041	113. 56	3. 37	106. 12	−25. 8	393
		6	·6667	105. 12	4. 47	107. 22	−18. 34	393
		7	·7604	99. 47	356. 10	98. 45	−16. 10	393
		8	·8721	99. 55	344. 34	87. 9	−17. 23	393
		9	·9947	106. 50	319. 39	62. 14	−24. 22	394
Feb. 3	33·481	2410	·9537	284. 31	126. 49	31. 13	+24. 2	395
		1	·2924	310. 18	69. 28	333. 52	+ 7. 27	396
		2	·2487	333. 53	62. 37	327. 1	+ 7. 48	396
		3	·3330	138. 15	49. 29	313. 53	−23. 1	397
		4	·5816	9. 50	44. 46	309. 10	+26. 15	398
		5	·7124	101. 37	15. 26	279. 50	−21. 50	399
		6	·9017	95. 1	354. 40	259. 4	−19. 3	401

1859.	Day.	No.	Dist.	Pos.	Fr. Node.	II. Long.	II. Lat.	Group.
				° ′	° ′	° ′	° ′	
Feb. 3		2417	·8918	42. 10	4. 10	268. 34	+26. 59	400
		8	·8690	44. 17	6. 8	270. 32	+24. 12	400
24	54·542	9	·5878	229. 12	115. 57	81. 36	−17. 36	402
		2420	·5738	242. 10	115. 56	81. 35	−10. 3	402
		1	·4428	235. 17	106. 46	72. 25	−12. 38	402
		2	·3333	199. 5	93. 55	59. 34	−21. 44	403
		3	·2525	215. 5	93. 11	58. 50	−15. 6	403
		4	·2134	195. 56	88. 21	54. 0	−16. 52	403
		5	·2987	179. 25	87. 5	52. 44	−23. 17	403
		6	·3308	84. 14	61. 49	27. 28	−11. 28	404
		7	·4666	84. 36	53. 21	19. 0	−13. 12	404
		8	·7204	68. 12	34. 47	0. 26	− 3. 54	405
		9	·8216	87. 18	25. 22	351. 1	−18. 31	406
		2430	·8709	85. 15	19. 43	345. 22	−17. 4	406
		1	·8961	56. 37	19. 5	344. 44	+ 8. 18	407
		2	·9568	59. 41	9. 11	334. 50	+ 7. 18	407
Mar. 3	61·678	3	·5751	269. 57	120. 16	344. 41	+ 6. 28	407
		4	·4517	279. 54	110. 35	335. 0	+ 7. 15	407
		5	·3804	290. 12	104. 24	328. 49	+ 7. 57	407
		6	·5527	227. 57	120. 46	345. 11	−16. 48	406
		7	·5189	25. 35	64. 47	289. 12	+13. 45	408
		8	·8934	84. 38	24. 4	248. 29	−18. 16	411
6	64·512	9	·9409	256. 19	159. 43	343. 56	+ 6. 6	407
		2440	·8765	259. 29	150. 18	334. 31	+ 7. 12	407
		1	·4208	302. 12	105. 7	289. 20	+13. 10	408
		2	·3553	337. 42	90. 39	274. 52	+13. 33	408
		3	·7938	34. 58	45. 23	229. 36	+19. 58	412
		4	·8390	39. 42	39. 23	223. 36	+18. 18	412
		5	·7859	39. 1	44. 49	229. 2	+16. 42	412
		6	·7725	46. 55	43. 31	227. 44	+10. 37	412
		7	·9386	52. 51	23. 18	207. 31	+10. 41	413
		8	·7159	357. 56	72. 49	257. 2	+35. 3	409
8	66·521	9	·7061	273. 18	133. 6	288. 50	+12. 58	408
		2450	·5487	12. 9	73. 12	228. 56	+19. 43	412
		1	·4670	321. 5	100. 31	256. 15	+19. 31	410
		2	·7151	43. 25	51. 3	206. 47	+11. 4	413
	66·531	3	·5458	11. 58	73. 26	229. 1	+19. 37	412
		4	·5916	21. 12	67. 5	222. 40	+18. 26	412
		5	·7138	43. 38	51. 6	206. 41	+10. 53	413
		6	·6670	46. 50	53. 49	209. 24	+ 7. 31	413
9	67·486	7	·8264	267. 11	146. 4	288. 6	+12. 37	408
		8	·4658	351. 2	86. 46	228. 48	+19. 35	412
		9	·4879	3. 40	80. 19	222. 21	+18. 40	412
		2460	·5712	34. 42	64. 19	206. 21	+11. 15	413
	67·499	1	·4673	350. 52	86. 49	228. 41	+19. 42	412
		2	·4856	3. 28	80. 30	222. 22	+18. 35	412
		3	·5057	33. 29	68. 31	210. 23	+ 9. 29	413
		4	·9584	79. 27	19. 30	161. 22	−14. 25	415
	67·540	5	·5549	299. 40	114. 30	256. 22	+19. 36	410
		6	·4676	349. 24	87. 34	229. 26	+19. 53	412
		7	·4140	76. 33	69. 32	211. 24	−10. 40	414
		8	·9756	85. 54	15. 8	157. 0	−20. 27	415
10	68·629	9	·9431	262. 54	162. 51	288. 41	+13. 3	408

1859.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Mar. 10		2470	·6875	222. 53	137. 24	263. 14	−21. 7	411
		1	·4732	320. 10	103. 0	228. 50	+19. 51	412
		2	·4427	333. 3	96. 31	222. 21	+18. 59	412
		3	·3333	6. 28	85. 16	211. 6	+ 9. 38	413
		4	·3936	12. 46	81. 15	207. 5	+11. 26	413
		5	·3751	15. 32	81. 8	206. 58	+ 9. 53	413
		6	·1803	77. 29	84. 45	210. 35	− 9. 2	414
		7	·2865	74. 25	78. 24	204. 14	− 9. 10	414
		8	·8380	78. 57	37. 38	163. 28	−14. 30	415
		9	·8866	85. 49	32. 4	157. 54	−20. 36	415
11	69·449	2480	·8347	225. 21	152. 26	266. 37	−21. 12	411
		1	·5353	302. 48	113. 58	228. 9	+19. 42	412
		2	·4801	312. 54	107. 21	221. 32	+19. 5	412
		3	·0263	185. 36	96. 35	210. 46	− 8. 26	414
		4	·2898	328. 58	97. 55	212. 6	+ 9. 31	413
		5	·2847	348. 56	92. 11	206. 22	+ 8. 56	413
		6	·3234	346. 51	92. 20	206. 31	+11. 19	413
		7	·7978	86. 51	43. 7	157. 18	−20. 47	415
		8	·7379	79. 8	48. 7	162. 18	−14. 24	415
18	76·482	9	·6676	290. 6	133. 20	147. 46	+22. 10	416
		2490	·6419	299. 28	127. 5	141. 31	+25. 3	416
		1	·6672	220. 4	143. 21	157. 47	−21. 38	415
		2	·5625	223. 42	136. 6	150. 32	−17. 37	415
		3	·0967	36. 37	98. 1	112. 27	− 4. 21	417
		4	·2195	62. 30	90. 12	104. 38	− 6. 17	417
		5	·3721	9. 42	90. 29	104. 55	+10. 54	418
		6	·4087	11. 40	88. 29	102. 55	+12. 17	418
		7	·4246	19. 38	85. 17	99. 43	+10. 51	418
		8	·4305	83. 1	78. 3	92. 27	−13. 59	419
		9	·5754	82. 12	68. 15	82. 41	−15. 34	419
		2500	·6933	94. 6	61. 9	75. 35	−24. 57	420
19	77·474	1	·8102	222. 47	157. 41	158. 4	−21. 52	415
		2	·7236	227. 2	149. 59	150. 22	−17. 38	415
		3	·7813	280. 19	147. 1	147. 24	+21. 54	416
		4	·7449	288. 13	140. 29	140. 52	+25. 10	416
		5	·1792	257. 56	113. 55	114. 18	− 4. 32	417
		6	·0110	282. 12	104. 23	104. 46	− 6. 35	417
		7	·3054	333. 2	104. 27	104. 50	+10. 44	418
		8	·3976	358. 31	94. 26	94. 49	+14. 24	418
		9	·2391	98. 9	92. 2	92. 25	−14. 20	419
		2510	·3973	87. 39	81. 40	82. 3	−15. 17	419
		1	·5556	100. 59	74. 18	74. 41	−25. 9	420
20	78·627	2	·8988	273. 34	163. 2	147. 3	+22. 8	416
		3	·8755	228. 7	166. 37	150. 38	−17. 49	415
		4	·9261	224. 3	173. 38	157. 39	−21. 41	415
		5	·4048	292. 31	121. 2	105. 3	+10. 44	418
		6	·3918	313. 38	113. 22	97. 23	+14. 30	418
		7	·3848	247. 31	127. 38	111. 39	− 5. 19	417
		8	·3163	250. 22	123. 22	107. 23	− 4. 47	417
		9	·1417	179. 30	108. 32	92. 33	−14. 16	419
		2520	·1823	117. 2	98. 27	82. 28	−15. 8	419
		1	·2772	116. 15	94. 34	78. 35	−19. 18	419
		2	·3216	143. 9	100. 59	85. 0	−25. 11	420

1859.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Mar. 20		2523	·3883	119. 53	90. 55	74. 56	−25. 14	420
		4	·9835	41. 33	29. 23	13. 24	+21. 10	421
22	80·457	5	·7646	243. 37	156. 47	114. 50	− 5. 6	417
		6	·6635	244. 40	148. 27	106. 30	− 5. 1	417
		7	·6829	268. 54	146. 1	104. 4	+11. 4	418
		8	·6285	277. 5	139. 48	97. 51	+14. 0	418
		9	·4617	225. 43	133. 36	91. 39	−14. 39	419
		2530	·3098	216. 0	123. 10	81. 13	−15. 3	419
		1	·3568	177. 57	115. 54	73. 57	−25. 48	420
		2	·8529	34. 32	54. 41	12. 44	+21. 2	421
		3	·9029	35. 16	48. 25	6. 28	+22. 38	421
		4	·9232	40. 8	44. 1	2. 4	+19. 19	421
31	89·515	5	·9548	266. 23	184. 42	14. 16	+19. 19	421
		6	·9074	266. 18	177. 3	6. 37	+17. 18	421
		7	·8633	274. 10	169. 10	358. 44	+22. 5	421
		8	·6283	262. 41	152. 28	342. 2	+ 6. 33	422
		9	·5175	218. 16	145. 15	334. 49	−18. 28	423
		2540	·4357	327. 41	118. 39	308. 13	+19. 7	425
		1	·4005	82. 12	93. 0	282. 34	−13. 12	427
		2	·5294	88. 25	85. 33	275. 7	−18. 18	427
		3	·5933	84. 54	80. 32	270. 6	−17. 36	427
		4	·8238	83. 21	60. 33	250. 7	−19. 45	429
Apr. 1	90·476	5	·9458	269. 55	183. 3	359. 0	+22. 12	421
		6	·7720	255. 55	165. 53	341. 50	+ 5. 11	422
		7	·7116	223. 23	161. 29	337. 26	−18. 52	423
		8	·4924	303. 6	132. 7	308. 4	+18. 48	425
		9	·3193	224. 44	134. 43	310. 40	−12. 2	424
		2550	·2072	99. 57	106. 59	282. 56	−13. 19	427
		1	·3599	99. 47	99. 4	275. 1	−18. 17	427
		2	·4346	93. 49	93. 35	269. 32	−18. 26	427
		3	·6948	85. 35	73. 47	249. 44	−19. 40	429
3	92·589	4	·7563	274. 50	161. 45	307. 43	+18. 26	425
		5	·7060	297. 10	147. 29	293. 27	+28. 59	426
		6	·9602	227. 3	193. 35	339. 33	−17. 39	423
		7	·3510	221. 25	138. 21	284. 19	−13. 32	427
		8	·2683	199. 27	130. 27	276. 25	−16. 54	427
		9	·2264	173. 46	123. 36	269. 34	−18. 29	427
7	96·476	2560	·7104	213. 29	165. 24	256. 14	−25. 19	428
		1	·5316	216. 40	152. 44	243. 34	−19. 8	429
		2	·4659	212. 11	147. 35	238. 25	−19. 30	429
		3	·7974	20. 55	81. 13	172. 3	+28. 11	430
		4	·8507	21. 8	75. 53	166. 43	+30. 57	430
21	110·502	5	·9631	269. 33	207. 1	98. 54	+22. 35	431
		6	·3030	174. 15	142. 49	34. 42	−21. 24	432
		7	·2815	159. 26	138. 1	29. 54	−21. 9	432
		8	·5644	93. 21	104. 56	356. 49	−20. 3	433
		9	·7151	86. 34	92. 10	344. 3	−19. 12	433
		2570	·7931	85. 36	84. 56	336. 49	−19. 46	433
		1	·8036	44. 3	86. 1	337. 54	+13. 3	434
		2	·8345	47. 34	82. 13	334. 6	+11. 4	434
May 5	124·483	3	·9071	229. 15	214. 50	268. 24	−17. 12	435
		4	·8957	225. 44	212. 57	266. 31	−20. 13	435
		5	·8006	272. 41	199. 3	252. 37	+18. 14	436

1859.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
May 5		2576	·6165	275. 50	183. 39	237. 13	+14. 29	436
		7	·5709	282. 50	178. 37	232. 11	+16. 31	436
		8	·4684	217. 26	175. 10	228. 44	−16. 24	437
		9	·4827	182. 3	163. 45	217. 19	−29. 13	438
		2580	·4537	168. 33	156. 15	209. 49	−29. 48	438
		1	·3933	111. 32	132. 57	186. 31	−19. 30	439
		2	·3613	97. 29	131. 29	185. 3	−14. 4	439
		3	·4591	88. 38	124. 15	177. 49	−13. 8	439
		4	·8238	81. 19	95. 1	148. 35	−14. 9	440
8	127·508	5	·9413	265. 19	221. 8	231. 48	+15. 46	436
		6	·9095	230. 45	218. 3	228. 43	−16. 20	437
		7	·7824	216. 55	201. 10	211. 50	−25. 24	438
		8	·7584	212. 52	197. 45	208. 25	−27. 37	438
		9	·4055	219. 2	174. 29	185. 9	−14. 3	439
		2590	·3189	103. 39	137. 41	148. 21	−14. 1	440
		1	·6482	35. 13	117. 57	128. 37	+17. 22	441
		2	·7127	35. 32	113. 6	123. 46	+19. 26	441
		3	·6926	73. 12	109. 15	119. 55	− 6. 29	442
		4	·7549	67. 55	104. 5	114. 45	− 2. 39	442
		5	·9196	90. 18	86. 56	97. 36	−22. 26	444
		6	·9783	89. 14	74. 50	85. 30	−22. 11	444
12	131·542	7	·9654	234. 42	231. 41	185. 8	−13. 46	439
		8	·6264	229. 34	194. 20	147. 47	−13. 46	440
		9	·1833	226. 7	166. 38	120. 5	− 6. 44	442
		2600	·0724	243. 53	160. 58	114. 25	− 3. 8	442
		1	·5136	296. 1	178. 14	131. 41	+19. 38	441
		2	·4343	308. 33	169. 57	123. 24	+19. 19	441
		3	·5479	351. 0	148. 52	102. 19	+29. 21	443
		4	·5873	357. 44	143. 41	97. 8	+30. 43	443
		5	·4096	122. 23	141. 54	95. 21	−22. 3	444
		6	·4314	111. 57	137. 33	91. 0	−19. 57	444
		7	·5446	106. 12	129. 22	82. 49	−22. 1	444
		8	·9800	52. 24	79. 46	33. 13	+14. 52	445
22	141·664	9	·8436	270. 23	221. 54	31. 46	+15. 9	445
		2610	·2451	159. 19	166. 3	335. 55	−15. 48	446
		1	·3763	149. 23	161. 45	331. 37	−23. 12	446
		2	·5281	32. 19	141. 2	310. 54	+17. 45	447
26	145·539	3	·2777	328. 29	174. 9	289. 3	+14. 21	448
		4	·2780	348. 4	168. 36	283. 30	+14. 46	448
		5	·7784	59. 17	120. 13	235. 7	+ 9. 23	450
		6	·8551	61. 28	112. 18	227. 12	+ 8. 41	450
		7	·8499	57. 24	113. 22	228. 16	+12. 2	450
		8	·9330	38. 41	106. 2	220. 56	+30. 38	453
		9	·6048	116. 22	141. 24	256. 18	−25. 47	449
		2620	·6832	113. 52	134. 58	249. 52	−27. 47	449
		1	·8259	98. 1	117. 11	232. 5	−21. 35	451
		2	·8688	96. 45	112. 4	226. 58	−21. 33	451
		3	·9463	83. 53	99. 28	214. 22	−11. 13	452
June 5	155·652	4	·9243	288. 58	243. 23	214. 51	+29. 58	453
		5	·8383	299. 3	227. 59	199. 27	+34. 39	453
		6	·4340	294. 51	200. 20	171. 48	+15. 39	456
		7	·4108	303. 48	196. 38	168. 6	+17. 34	456
		8	·3995	24. 42	164. 42	136. 10	+18. 7	457

1859.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
June 5		2629	·5822	43. 56	148. 46	120. 14	+18. 1	458
		2630	·8863	232. 24	239. 52	211. 20	−20. 54	454
		1	·8421	226. 29	233. 12	204. 40	−24. 36	454
		2	·5794	232. 49	212. 48	184. 16	−13. 15	455
		3	·4720	224. 14	204. 9	175. 37	−14. 26	455
		4	·8015	92. 1	127. 49	99. 17	−12. 37	459
9	159·563	5	·9731	242. 55	259. 24	175. 23	−14. 18	455
		6	·9210	276. 24	249. 21	165. 20	+17. 16	456
		7	·6403	285. 31	219. 52	135. 51	+17. 39	457
		8	·6196	287. 12	217. 58	133. 57	+18. 2	457
		9	·2283	167. 20	183. 26	99. 25	−12. 42	459
		2640	·2711	11. 41	177. 2	93. 1	+14. 43	460
		1	·3282	21. 15	172. 42	88. 41	+16. 15	460
		2	·5936	40. 29	153. 10	69. 9	+21. 22	461
		3	·9761	39. 32	109. 21	25. 20	+37. 13	465
12	162·524	4	·6601	238. 44	225. 33	99. 32	−12. 32	459
		5	·9590	277. 36	259. 0	132. 59	+18. 3	457
		6	·8417	275. 39	242. 28	116. 27	+14. 23	458
		7	·5717	282. 57	218. 47	92. 46	+14. 3	460
		8	·4467	153. 46	178. 58	52. 57	−24. 38	462
		9	·8165	100. 53	134. 4	8. 3	−17. 12	468
		2650	·7979	86. 44	133. 57	7. 56	− 5. 40	467
		1	·7725	28. 33	148. 24	22. 23	+37. 3	465
		2	·7888	62. 54	135. 27	9. 26	+13. 5	466
16	166·556	3	·8445	229. 11	242. 47	59. 35	−25. 21	462
		4	·7709	226. 31	234. 34	51. 22	−24. 40	462
		5	·7727	301. 57	232. 56	49. 44	+31. 28	463
		6	·4315	293. 51	212. 0	28. 48	+14. 46	464
		7	·2089	334. 3	193. 39	10. 27	+12. 46	466
		8	·9341	64. 2	121. 50	298. 38	+15. 59	471
		9	·3086	173. 15	190. 58	7. 46	−16. 36	468
23	173·597	2660	·9429	236. 26	263. 57	340. 52	−24. 51	469
		1	·6726	221. 11	229. 53	306. 48	−25. 15	470
		2	·4868	293. 13	222. 51	299. 46	+15. 39	471
		3	·8829	110. 42	138. 39	215. 34	−22. 24	477
		4	·8920	106. 59	136. 36	213. 31	−19. 29	477
		5	·6953	94. 22	153. 36	230. 31	− 5. 46	476
		6	·5904	66. 40	161. 48	238. 43	+11. 42	475
		7	·6747	67. 12	155. 30	232. 25	+12. 39	475
		8	·9184	51. 39	133. 1	209. 56	+30. 9	478
26	176·560	9	·9734	237. 42	273. 20	308. 14	−25. 58	470
		2670	·5478	206. 47	218. 7	253. 1	−25. 23	472
		1	·1636	148. 41	195. 27	230. 21	− 5. 58	476
		2	·3379	131. 44	185. 58	220. 52	−11. 48	476
		3	·4865	140. 49	182. 35	217. 29	−21. 17	477
		4	·5109	132. 12	178. 2	212. 56	−19. 38	477
		5	·6303	123. 31	167. 50	202. 44	−20. 54	477
		6	·8367	104. 14	145. 7	180. 1	−14. 27	479
		7	·6013	35. 7	173. 23	208. 17	+29. 30	478
30	180·512	8	·9020	288. 51	266. 47	245. 41	+20. 56	474
		9	·8745	291. 4	262. 50	241. 44	+22. 22	474
		2680	·9371	257. 11	272. 1	250. 51	− 8. 6	473
		1	·7496	254. 50	250. 48	229. 38	− 7. 5	476

1859.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
June 30		2682	·6476	224. 42	234. 43	213. 33	−23. 16	477
		3	·5929	227. 45	232. 26	211. 16	−19. 25	477
		4	·3078	170. 47	201. 26	180. 16	−14. 53	479
		5	·4034	172. 48	201. 36	180. 26	−20. 46	479
		6	·5623	318. 14	226. 53	205. 43	+28. 33	478
		7	·7831	65. 9	153. 26	132. 16	+18. 42	481
July 3	183·525	8	·9102	240. 28	267. 29	203. 34	−23. 36	477
		9	·6645	241. 45	244. 1	180. 6	−14. 43	479
		2690	·6040	234. 23	237. 42	173. 47	−16. 55	479
		1	·8939	298. 56	267. 12	203. 17	+28. 36	478
		2	·5068	290. 39	234. 59	171. 4	+13. 51	480
		3	·4598	295. 17	231. 13	167. 18	+14. 53	480
		4	·8394	64. 54	150. 42	86. 47	+21. 15	483
		5	·8815	64. 59	145. 41	81. 46	+21. 58	483
		6	·9926	59. 8	122. 47	58. 52	+29. 20	485
7	187·542	7	·4881	140. 42	191. 2	70. 9	−18. 39	484
		8	·6234	138. 51	183. 15	62. 22	−24. 37	484
		9	·5221	131. 54	186. 7	65. 14	−16. 59	484
		2700	·3304	4. 52	208. 22	87. 29	+22. 44	483
		1	·3599	27. 47	199. 43	78. 50	+22. 3	483
		2	·6637	48. 18	175. 42	54. 49	+29. 10	485
		3	·8811	80. 34	148. 20	27. 27	+10. 7	486
		4	·9450	75. 7	139. 8	18. 15	+15. 22	486
8	188·548	5	·3912	168. 40	206. 8	70. 59	−18. 43	484
		6	·3905	154. 19	200. 39	65. 30	−16. 45	484
		7	·3843	331. 43	222. 37	87. 28	+23. 13	483
		8	·3270	353. 27	213. 31	78. 22	+22. 33	483
		9	·9293	102. 54	144. 3	8. 54	− 9. 58	487
		2710	·5451	37. 10	189. 14	54. 5	+29. 18	485
		1	·7574	80. 19	161. 59	26. 50	+10. 12	486
		2	·8568	75. 58	152. 22	17. 13	+14. 25	486
		3	·8513	73. 49	153. 10	18. 1	+16. 11	486
10	190·599	4	·9069	243. 42	273. 28	109. 13	−23. 7	482
		5	·8704	242. 44	268. 27	104. 12	−22. 33	482
		6	·5446	201. 45	225. 5	60. 50	−26. 47	484
		7	·4996	224. 30	233. 49	69. 34	−17. 42	484
		8	·6697	303. 3	251. 19	87. 4	+23. 31	483
		9	·5718	307. 16	243. 4	78. 49	+22. 50	483
		2720	·7530	121. 54	169. 34	5. 19	−19. 29	487
		1	·4412	353. 55	216. 48	52. 33	+29. 43	485
		2	·3940	75. 5	190. 30	26. 15	+10. 0	486
		3	·5399	66. 53	182. 20	18. 5	+16. 20	486
		4	·7323	76. 46	166. 26	2. 11	+13. 25	488
		5	·8372	73. 1	156. 47	352. 32	+17. 35	488
17	197·553	6	·8758	250. 51	276. 54	14. 1	−18. 13	487
		7	·7430	245. 10	262. 17	359. 24	−18. 2	487
		8	·9323	284. 37	288. 35	25. 42	+10. 57	486
		9	·7189	289. 19	265. 6	2. 13	+13. 41	488
		2730	·6775	295. 17	260. 59	358. 6	+17. 14	488
		1	·3263	171. 56	215. 21	312. 28	−13. 55	490
		2	·3576	159. 45	210. 41	307. 48	−14. 19	490
		3	·5561	148. 2	198. 41	295. 48	−22. 8	492
		4	·2674	306. 13	233. 0	330. 7	+12. 28	489

1859.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
July 17		2735	·2917	84. 47	202. 49	299. 56	+ 7. 14	491
		6	·4052	83. 53	195. 57	293. 4	+ 8. 31	491
		7	·4193	77. 6	195. 36	292. 43	+11. 25	491
		8	·9503	113. 30	150. 15	247. 22	−16. 18	494
		9	·8672	107. 54	161. 3	258. 10	− 9. 5	494
		2740	·9405	106. 14	150. 50	247. 57	− 9. 15	494
		1	·5916	74. 57	184. 28	281. 35	+15. 13	493
		2	·6844	75. 31	177. 23	274. 30	+16. 20	493
		3	·6938	66. 53	178. 11	275. 18	+22. 15	493
		4	·7540	66. 25	173. 6	270. 13	+24. 1	493
21	201·523	5	·9405	287. 42	293. 49	334. 38	+12. 19	489
		6	·6146	283. 36	261. 14	302. 3	+ 8. 19	491
		7	·3238	332. 28	234. 25	275. 14	+20. 22	493
		8	·2726	161. 3	216. 36	257. 25	− 9. 18	494
		9	·4672	145. 38	204. 57	245. 46	−15. 58	494
		2750	·3531	137. 12	207. 45	248. 34	− 8. 32	494
		1	·6322	119. 20	187. 14	228. 3	−10. 15	495
		2	·7290	115. 34	179. 8	219. 57	−10. 19	495
		3	·8318	74. 25	167. 53	208. 42	+20. 55	496
		4	·9152	70. 6	157. 42	198. 31	+25. 58	496
24	204·675	5	·9885	286. 25	308. 7	304. 12	+ 9. 22	491
		6	·8065	298. 59	279. 21	275. 26	+20. 8	493
		7	·6247	255. 9	262. 2	258. 7	− 9. 37	494
		8	·5047	249. 43	253. 4	249. 9	− 9. 1	494
		9	·5055	233. 28	248. 22	244. 27	−15. 46	494
		2760	·2747	212. 35	233. 3	229. 8	− 9. 12	495
		1	·2773	177. 9	223. 25	219. 30	−10. 33	495
		2	·8788	122. 5	169. 0	165. 5	−18. 27	498
		3	·3574	47. 48	212. 11	208. 16	+20. 51	496
		4	·4580	47. 37	207. 28	203. 33	+25. 25	496
		5	·5307	55. 21	200. 43	196. 48	+25. 35	496
		6	·4833	76. 40	198. 43	194. 48	+14. 35	497
		7	·9220	69. 48	159. 41	155. 46	+27. 41	499
28	208·624	8	·9709	262. 12	303. 53	243. 58	−15. 10	494
		9	·9819	269. 21	307. 55	248. 0	− 8. 43	494
		2770	·8781	267. 56	290. 7	230. 12	− 7. 17	495
		1	·7977	265. 2	281. 14	221. 19	− 7. 56	495
		2	·5032	182. 59	226. 38	166. 43	−24. 22	498
		3	·3683	185. 22	228. 37	168. 42	−15. 57	498
		4	·4547	169. 6	220. 33	160. 38	−19. 42	498
		5	·5083	124. 51	202. 41	142. 46	− 7. 42	500
		6	·6261	124. 47	195. 7	135. 12	−11. 2	500
		7	·6228	308. 3	266. 3	206. 8	+21. 49	496
		8	·5800	324. 51	257. 49	197. 54	+29. 14	496
		9	·5262	322. 51	255. 13	195. 18	+26. 9	496
		2780	·3174	330. 54	242. 12	182. 17	+19. 43	497
		1	·2650	352. 54	234. 43	174. 48	+20. 9	497
		2	·5316	85. 29	198. 27	138. 32	+12. 0	501
		3	·9825	115. 25	153. 2	93. 7	−14. 34	502
31	211·515	4	·9603	302. 18	307. 29	206. 34	+22. 27	496
		5	·9031	311. 32	296. 27	195. 32	+30. 19	496
		6	·8525	307. 37	290. 18	189. 23	+25. 57	496
		7	·7667	301. 58	282. 9	181. 14	+20. 0	497

1859.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
July 31		2788	·7040	249. 4	271. 40	170. 45	−17. 5	498
		9	·6512	245. 59	266. 52	165. 57	−16. 53	498
		2790	·2122	336. 23	240. 0	139. 5	+15. 45	501
		1	·3025	229. 24	243. 55	143. 0	− 7. 57	500
		2	·7428	80. 48	185. 39	84. 44	+18. 26	503
		3	·7987	79. 4	180. 36	79. 41	+20. 32	503
		4	·7073	128. 15	192. 43	91. 48	−14. 47	502
Aug. 4	215·486	5	·8582	297. 7	296. 3	138. 48	+15. 55	501
		6	·8122	298. 59	290. 57	133. 42	+17. 9	501
		7	·4185	224. 9	249. 57	92. 42	−14. 51	502
		8	·4061	214. 58	246. 8	88. 53	−15. 58	502
		9	·2400	348. 14	242. 35	85. 20	+18. 35	503
		2800	·2524	16. 44	235. 30	78. 15	+20. 30	503
		1	·9513	85. 13	163. 58	6. 43	+17. 54	507
		2	·8999	113. 50	174. 10	16. 55	− 7. 46	506
		3	·9427	113. 37	167. 49	10. 34	− 8. 42	506
		4	·9339	126. 27	171. 56	14. 41	−20. 7	505
11	222·735	5	·5485	250. 43	271. 17	11. 13	−12. 10	506
		6	·4717	244. 24	265. 8	5. 4	−11. 46	506
		7	·7820	298. 9	295. 17	35. 13	+14. 24	504
		8	·2950	322. 36	257. 44	357. 40	+16. 36	507
		9	·3366	85. 49	224. 47	324. 43	+12. 22	508
		2810	·4789	90. 13	215. 29	315. 25	+12. 35	508
		1	·7133	98. 27	198. 1	297. 57	+ 9. 3	508
14	225·529	2	·8716	268. 40	304. 22	4. 40	−11. 26	506
		3	·8029	295. 36	300. 6	0. 24	+11. 45	507
		4	·3312	303. 44	265. 7	325. 25	+12. 3	508
		5	·2622	312. 46	260. 14	320. 32	+13. 11	508
		6	·1691	325. 2	254. 5	314. 23	+12. 37	508
		7	·1543	86. 14	237. 58	298. 16	+ 9. 27	508
		8	·9141	137. 45	187. 13	247. 31	−25. 38	511
		9	·9646	115. 34	173. 7	233. 25	− 7. 33	513
		2820	·5597	92. 17	212. 37	272. 55	+12. 59	509
		1	·9016	78. 16	182. 13	242. 31	+27. 36	512
18	229·511	2	·8405	298. 0	307. 51	311. 40	+12. 45	508
		3	·7896	298. 20	302. 41	306. 30	+12. 57	508
		4	·3833	44. 32	238. 57	242. 46	+26. 26	512
		5	·5135	56. 55	228. 12	232. 1	+29. 26	512
		6	·6429	175. 42	234. 33	238. 22	−30. 8	511
		7	·6842	153. 51	219. 28	223. 17	−24. 0	514
		8	·7169	148. 49	214. 50	218. 39	−22. 55	514
		9	·8117	146. 16	205. 56	209. 45	−26. 0	514
		2830	·5335	150. 40	226. 42	230. 31	−15. 18	513
		1	·4395	141. 18	228. 48	232. 37	− 7. 57	513
		2	·6613	97. 55	208. 44	212. 33	+11. 9	515
		3	·7203	96. 2	204. 2	207. 51	+12. 40	515
		4	·8083	85. 22	196. 41	200. 30	+21. 31	516
21	232·533	5	·6584	311. 8	293. 14	254. 11	+20. 10	510
		6	·6210	317. 31	289. 7	250. 4	+23. 18	510
		7	·5365	327. 56	280. 24	241. 21	+26. 9	512
		8	·4929	343. 51	271. 53	232. 50	+30. 27	512
		9	·6621	230. 41	276. 48	237. 45	−27. 32	511
		2840	·4009	249. 31	271. 33	232. 30	− 7. 55	513

1859.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Aug. 21		2841	·5011	205. 57	257. 25	218. 22	−22. 48	514
		2	·5214	189. 41	248. 24	209. 21	−24. 5	514
		3	·0783	27. 46	252. 23	213. 20	+11. 16	515
		4	·3388	60. 42	239. 2	199. 59	+21. 3	516
		5	·9302	86. 32	183. 58	144. 55	+22. 33	519
		6	·6591	159. 13	226. 12	187. 9	−24. 41	517
		7	·6557	148. 52	221. 31	182. 28	−19. 27	517
		8	·7913	139. 10	207. 26	168. 23	−19. 19	518
		9	·8804	141. 24	199. 6	160. 3	−24. 56	518
25	236·521	2850	·9474	278. 6	326. 42	231. 6	− 8. 14	513
		1	·8958	260. 21	314. 36	219. 0	−22. 3	514
		2	·7744	298. 21	308. 8	212. 32	+11. 24	515
		3	·6227	315. 7	293. 54	198. 18	+21. 19	516
		4	·6760	241. 50	286. 54	191. 18	−23. 46	517
		5	·6419	233. 48	280. 42	185. 6	−25. 28	517
		6	·6028	228. 20	275. 49	180. 13	−25. 5	517
		7	·4548	212. 9	263. 10	167. 34	−19. 16	518
		8	·5363	194. 16	254. 5	158. 29	−25. 10	518
		9	·4499	175. 43	246. 14	150. 38	−17. 23	518
		2860	·5882	159. 37	233. 31	137. 55	−20. 26	518
		1	·4011	65. 4	238. 59	143. 23	+22. 51	519
		2	·8576	80. 25	198. 49	103. 13	+28. 16	520
		3	·9248	96. 19	188. 40	93. 4	+14. 39	520
		4	·9712	88. 53	179. 27	83. 51	+21. 27	520
28	239·540	5	·7890	258. 18	305. 11	166. 44	−19. 40	518
		6	·7350	245. 45	295. 19	156. 52	−25. 10	518
		7	·9639	310. 16	335. 51	197. 24	+21. 12	516
		8	·4262	332. 20	280. 1	141. 34	+23. 12	519
		9	·3602	337. 11	275. 18	136. 51	+22. 2	519
		2870	·9831	118. 39	181. 51	43. 24	− 6. 56	522
		1	·4746	60. 10	239. 54	101. 27	+27. 53	520
		2	·4610	96. 0	232. 50	94. 23	+12. 45	520
		3	·5188	87. 3	230. 3	91. 36	+17. 52	520
		4	·6583	78. 2	221. 49	83. 22	+26. 3	520
		5	·6542	88. 3	220. 6	81. 39	+19. 41	520
Sept. 1	243·472	6	·5079	307. 31	293. 55	99. 42	+14. 21	520
		7	·5699	331. 35	293. 7	98. 54	+27. 50	520
		8	·4223	320. 55	286. 30	92. 17	+18. 37	520
		9	·3489	306. 51	283. 51	89. 38	+12. 4	520
		2880	·3522	331. 27	280. 23	86. 10	+19. 56	520
		1	·3774	352. 43	275. 22	81. 9	+26. 17	520
		2	·2574	352. 54	271. 16	77. 3	+20. 6	520
		3	·3159	189. 59	260. 16	66. 3	−10. 52	521
		4	·4914	140. 26	238. 19	44. 6	− 7. 25	522
		5	·6171	133. 56	228. 54	34. 41	− 7. 55	522
		6	·7934	126. 37	213. 31	19. 18	− 7. 37	524
		7	·8718	131. 27	206. 41	12. 28	−13. 44	524
		8	·6646	87. 18	223. 23	29. 10	+21. 4	523
		9	·9486	91. 16	191. 10	356. 57	+21. 8	525
11	253·437	2890	·8802	254. 5	324. 53	349. 19	−29. 33	526
		1	·8201	249. 32	316. 9	340. 35	−29. 26	526
		2	·8222	255. 26	319. 16	343. 42	−25. 28	526
		3	·9776	283. 51	349. 57	14. 23	− 7. 45	524

1859.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Sept. 11		2894	·4774	179. 53	262. 0	286. 26	−18. 50	529
		5	·5238	170. 34	256. 8	280. 34	−19. 10	529
		6	·5601	298. 52	307. 48	332. 14	+ 8. 57	527
		7	·8335	312. 56	330. 11	354. 37	+20. 8	525
		8	·1738	80. 13	265. 4	289. 30	+12. 31	528
		9	·2686	95. 53	258. 30	282. 56	+11. 33	528
		2900	·7421	110. 24	225. 29	249. 55	+ 7. 4	531
		1	·8210	112. 9	218. 18	242. 44	+ 5. 10	531
		2	·5617	92. 47	240. 19	264. 45	+17. 25	530
15	257·472	3	·7620	260. 45	319. 49	287. 1	−19. 34	529
		4	·6690	253. 45	310. 9	277. 21	−19. 42	529
		5	·6719	304. 16	319. 55	287. 7	+12. 0	528
		6	·1135	294. 57	284. 5	251. 17	+ 7. 9	531
		7	·0126	108. 13	276. 49	244. 1	+ 7. 11	531
		8	·3528	328. 13	295. 23	262. 35	+18. 6	530
		9	·4392	109. 20	251. 24	218. 36	+ 8. 31	533
		2910	·5099	106. 39	246. 48	214. 0	+ 9. 57	533
		1	·7904	92. 44	225. 38	192. 50	+21. 15	535
18	260·437	2	·9709	272. 47	352. 48	277. 57	−19. 13	529
		3	·6337	262. 20	313. 48	238. 57	−13. 53	532
		4	·7221	162. 32	247. 50	172. 59	−26. 23	536
		5	·7252	298. 29	327. 9	252. 18	+ 7. 37	531
		6	·8415	309. 22	338. 10	263. 19	+16. 8	530
		7	·2294	298. 43	293. 45	218. 54	+ 7. 47	533
		8	·0694	315. 23	284. 12	209. 21	+ 8. 26	533
		9	·1608	11. 14	282. 41	207. 50	+16. 0	534
		2920	·3420	65. 29	266. 36	191. 45	+21. 47	535
29	271·462	1	·9057	318. 31	356. 36	125. 22	+23. 13	538
		2	·8058	323. 45	343. 44	112. 30	+26. 12	538
		3	·4785	330. 26	316. 22	85. 8	+21. 44	539
		4	·9609	267. 25	359. 48	128. 34	−25. 0	537
		5	·4948	260. 24	315. 25	84. 11	−10. 34	540
		6	·5332	171. 42	272. 50	41. 36	−19. 43	542
		7	·2731	159. 12	279. 53	48. 39	− 4. 12	541
		8	·3498	155. 45	275. 43	44. 29	− 6. 27	541
		9	·6350	146. 30	257. 18	26. 4	−13. 15	543
		2930	·8096	143. 44	242. 45	11. 31	−17. 46	543
		1	·7952	136. 1	241. 52	10. 38	−11. 30	543
		2	·8755	132. 25	232. 47	1. 33	−10. 54	543
		3	·9905	147. 24	214. 44	343. 30	−29. 45	547
Oct. 6	278·560	4	·9741	273. 18	11. 31	39. 36	−20. 41	542
		5	·9776	275. 28	12. 58	41. 3	−18. 48	542
		6	·9532	283. 42	8. 56	37. 1	− 9. 59	543
		7	·8683	278. 25	355. 50	23. 55	−12. 7	543
		8	·7421	274. 30	342. 51	10. 56	−11. 30	543
		9	·7357	263. 4	338. 47	6. 52	−18. 58	544
		2940	·6953	256. 46	333. 17	1. 22	−21. 4	544
		1	·4187	249. 35	315. 20	343. 25	−11. 39	546
		2	·6093	216. 59	305. 50	333. 55	−30. 22	547
		3	·3303	308. 47	317. 24	345. 29	+10. 2	545
		4	·1979	311. 33	309. 28	337. 33	+ 9. 10	545
		5	·7712	149. 46	255. 7	283. 12	−20. 32	549
		6	·8630	148. 18	245. 38	273. 43	−23. 24	549

1859.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Oct. 6		2947	·6020	75. 0	267. 27	295. 32	+28. 48	548
		8	·9370	109. 35	228. 26	256. 31	+ 8. 32	550
9	281·531	9	·9791	273. 52	16. 2	1. 59	−20. 30	544
		2950	·8556	278. 47	357. 28	343. 25	−11. 36	546
		1	·8601	305. 11	1. 0	346. 57	+10. 41	545
		2	·8284	253. 17	345. 30	331. 27	−30. 5	547
		3	·4698	194. 33	295. 25	281. 22	−21. 10	549
		4	·5383	181. 25	287. 4	273. 1	−23. 9	549
		5	·4229	2. 10	312. 40	298. 37	+28. 36	548
		6	·5219	109. 3	269. 51	255. 48	+ 9. 3	550
		7	·8799	89. 55	240. 14	226. 11	+26. 7	551
		8	·8910	112. 41	238. 9	224. 6	+ 6. 5	553
		9	·9347	111. 23	231. 53	217. 50	+ 6. 51	553
20	292·539	2960	·9895	279. 12	31. 48	221. 36	−15. 44	552
		1	·9717	300. 51	28. 46	218. 34	+ 5. 57	553
		2	·9798	320. 45	31. 41	221. 29	+25. 15	551
		3	·7049	253. 0	346. 34	176. 22	−24. 17	554
		4	·5891	251. 19	338. 33	168. 21	−19. 38	554
		5	·5575	185. 20	299. 38	129. 26	−26. 7	556
		6	·7644	149. 21	269. 17	99. 5	−20. 54	558
		7	·8349	146. 45	261. 47	91. 35	−21. 52	558
		8	·2765	345. 54	322. 58	152. 46	+17. 22	555
		9	·2918	0. 21	319. 59	149. 47	+20. 27	555
		2970	·2153	355. 46	318. 42	148. 30	+15. 57	555
		1	·1923	38. 11	309. 51	139. 39	+16. 6	555
		2	·2394	60. 26	304. 11	133. 59	+16. 36	555
		3	·3107	73. 1	298. 33	128. 21	+17. 21	555
		4	·6418	77. 18	277. 51	107. 39	+28. 0	557
Nov. 3	306·530	5	·9953	314. 7	51. 31	42. 52	+20. 12	559
		6	·5653	304. 24	0. 22	351. 43	+ 9. 2	561
		7	·9570	281. 30	37. 56	29. 17	−10. 53	560
		8	·9361	279. 31	33. 54	25. 15	−12. 12	560
		9	·6921	260. 16	3. 37	354. 58	−19. 29	562
		2980	·6238	253. 32	356. 26	347. 47	−20. 27	562
		1	·5644	223. 10	338. 12	329. 33	−28. 13	563
		2	·5610	215. 38	333. 31	324. 52	−29. 14	563
		3	·6175	189. 21	315. 27	306. 48	−32. 34	564
		4	·8040	141. 5	277. 13	268. 34	−18. 40	565
		5	·8698	137. 41	269. 23	260. 44	−18. 5	565
		6	·9934	130. 58	244. 34	235. 55	−16. 6	568
10	313·478	7	·9821	259. 15	47. 56	300. 44	−31. 57	564
		8	·7405	265. 53	16. 45	279. 33	−17. 7	565
		9	·7405	264. 3	16. 13	279. 1	−18. 22	565
		2990	·6786	255. 15	8. 27	261. 15	−21. 38	565
		1	·6111	232. 15	353. 14	246. 2	−28. 56	566
		2	·3952	246. 13	349. 21	242. 9	−13. 28	568
		3	·3510	225. 7	341. 8	233. 56	−15. 38	568
		4	·3275	260. 58	349. 24	242. 12	− 6. 46	567
		5	·4668	161. 20	314. 24	207. 12	−17. 21	570
		6	·5303	157. 37	309. 53	202. 41	−18. 55	570
		7	·4267	46. 21	322. 14	215. 2	+26. 6	569
		8	·7606	140. 38	288. 13	181. 1	−18. 31	571
		9	·8429	138. 48	279. 49	172. 37	−19. 47	571

1859.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Nov. 10		3000	·9726	87. 5	256. 50	149. 38	+25. 39	573
13	316·536	1	·8971	257. 19	33. 39	243. 4	−29. 3	566
		2	·9724	269. 31	50. 18	259. 43	−20. 59	565
		3	·8540	274. 17	32. 48	242. 23	−13. 24	568
		4	·8721	284. 45	36. 16	245. 41	− 4. 48	567
		5	·7754	269. 16	23. 58	233. 23	−15. 24	568
		6	·4640	237. 16	352. 41	202. 6	−19. 22	570
		7	·3459	195. 22	333. 53	183. 18	−17. 6	571
		8	·4453	169. 39	321. 43	171. 8	−19. 13	571
		9	·5860	335. 42	4. 19	213. 44	+26. 23	569
		3010	·6870	75. 8	298. 27	147. 52	+26. 31	573
		1	·7829	78. 49	288. 55	138. 20	+27. 14	573
		2	·7731	132. 0	288. 8	137. 33	−13. 24	574
		3	·9379	143. 49	271. 31	120. 56	−28. 26	575
17	320·459	4	·9243	266. 19	44. 36	198. 22	−21. 29	570
		5	·8034	265. 49	30. 1	183. 47	−18. 15	571
		6	·7487	261. 46	23. 58	177. 44	−19. 31	571
		7	·4539	355. 36	352. 37	146. 23	+26. 31	573
		8	·5731	175. 37	324. 3	117. 49	−28. 45	575
		9	·7075	143. 38	300. 53	94. 39	−20. 34	578
		3020	·6932	130. 29	298. 32	92. 18	−11. 36	579
		1	·8049	127. 21	288. 22	82. 8	−11. 41	579
		2	·6190	91. 58	303. 18	97. 4	+13. 28	577
20	323·506	3	·8730	259. 3	39. 4	149. 37	−25. 24	572
		4	·8339	321. 1	36. 6	146. 39	+26. 42	573
		5	·6019	234. 0	5. 34	116. 7	−27. 52	575
		6	·2132	5. 55	346. 16	96. 49	+13. 58	577
		7	·2363	199. 29	343. 7	93. 40	−11. 31	579
		8	·3190	161. 24	331. 33	82. 6	−12. 21	579
		9	·7681	138. 50	297. 37	48. 10	−20. 17	580
		3030	·8970	121. 59	280. 33	31. 6	− 9. 50	583
		1	·9371	124. 42	275. 1	25. 34	−13. 3	583
		2	·7073	85. 33	300. 37	51. 10	+18. 27	581
		3	·7986	81. 22	293. 25	43. 58	+23. 43	581
		4	·7932	93. 45	291. 42	42. 15	+14. 1	582
24	327·541	5	·9707	259. 10	60. 19	113. 38	−27. 59	575
		6	·8097	272. 37	39. 46	93. 5	−11. 52	579
		7	·9694	300. 44	62. 48	116. 7	+12. 9	576
		8	·4553	242. 32	6. 33	59. 52	−17. 33	580
		9	·3676	342. 35	0. 25	53. 44	+18. 46	581
		3040	·3630	11. 12	350. 10	43. 29	+22. 35	581
		1	·2219	12. 13	348. 44	42. 3	+14. 16	582
		2	·2718	158. 52	337. 9	30. 28	−10. 27	583
		3	·3434	153. 58	333. 2	26. 21	−12. 33	583
		4	·6378	150. 7	316. 1	9. 20	−23. 34	584
		5	·7351	143. 2	306. 8	359. 27	−23. 17	584
27	330·478	6	·7258	316. 37	33. 3	44. 43	+21. 28	581
		7	·6728	322. 11	27. 11	38. 51	+23. 22	581
		8	·6672	308. 3	30. 15	41. 55	+14. 24	582
		9	·5025	263. 20	17. 55	29. 35	−10. 46	583
		3050	·4720	257. 52	14. 56	26. 36	−12. 21	583
		1	·4514	214. 31	358. 30	10. 10	−24. 15	584
		2	·2746	73. 43	336. 55	348. 35	+ 9. 57	585

1859.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Nov. 27		3053	·3358	78. 7	333. 0	344. 40	+10. 37	585
		4	·4361	63. 17	331. 3	342. 43	+18. 48	585
Dec. 11	344·520	5	·9834	260. 42	83. 5	255. 34	−20. 54	586
		6	·9166	268. 30	70. 4	242. 33	−12. 27	587
		7	·8136	260. 13	56. 44	229. 13	−17. 46	587
		8	·4082	200. 50	8. 21	180. 50	−24. 13	590
		9	·6044	317. 33	35. 46	208. 15	+20. 5	588
		3060	·5500	326. 43	29. 11	201. 40	+22. 13	588
		1	·3951	342. 38	16. 9	188. 38	+19. 32	589
		2	·3658	3. 17	7. 42	180. 11	+20. 33	589
		3	·6746	61. 26	329. 53	142. 22	+25. 24	592
		4	·9929	114. 7	281. 31	94. 0	−12. 12	595
15	348·549	5	·9160	256. 28	73. 1	188. 21	−21. 56	590
		6	·8621	252. 2	64. 56	180. 16	−24. 27	590
		7	·9182	302. 24	72. 50	188. 10	+19. 55	589
		8	·7884	315. 17	54. 10	169. 30	+26. 13	591
		9	·7171	323. 39	44. 36	159. 56	+28. 39	591
		3070	·5806	330. 53	32. 22	147. 42	+25. 40	592
		1	·5209	336. 52	26. 40	142. 0	+24. 43	592
		2	·6762	147. 28	336. 25	91. 45	−30. 37	596
		3	·5188	121. 22	338. 59	94. 19	−11. 44	595
		4	·8240	119. 18	314. 29	69. 49	−16. 19	597
		5	·9808	77. 46	291. 17	46. 37	+21. 36	598
18	351·519	6	·8771	307. 39	68. 36	141. 48	+24. 17	592
		7	·8319	301. 39	64. 54	138. 6	+18. 1	593
		8	·6577	297. 46	50. 36	123. 48	+11. 15	594
		9	·5729	301. 8	44. 0	117. 12	+11. 22	594
		3080	·2264	230. 13	20. 12	93. 24	−11. 8	595
		1	·3652	142. 28	355. 35	68. 47	−15. 56	597
		2	·7159	65. 13	331. 29	44. 41	+22. 6	598
		3	·8585	113. 5	313. 4	26. 16	−13. 1	599
22	355·486	4	·8708	265. 43	75. 36	92. 32	−10. 36	595
		5	·6164	253. 54	51. 23	68. 19	−15. 24	597
		6	·4444	343. 12	26. 30	43. 26	+22. 2	598
		7	·2304	160. 9	9. 22	26. 18	−13. 44	599
		8	·5612	111. 41	342. 12	359. 8	− 9. 50	600
		9	·6816	106. 41	332. 56	349. 52	− 8. 5	600
		3090	·9304	116. 29	307. 50	324. 46	−18. 56	601
27	360·535	1	·9712	297. 55	94. 18	39. 37	+22. 5	598
		2	·8298	266. 10	76. 26	21. 45	− 8. 14	599
		3	·7400	264. 18	67. 56	13. 15	− 9. 9	599
		4	·5656	260. 35	54. 18	359. 37	− 9. 51	600
		5	·4198	260. 10	44. 44	350. 3	− 8. 13	600
		6	·2961	170. 10	16. 10	321. 29	−19. 7	601
		7	·9426	115. 19	310. 44	256. 3	−20. 31	603
		8	·4920	54. 10	357. 40	302. 59	+16. 8	602
		9	·5782	72. 29	347. 41	293. 0	+10. 18	602
Jan. 2	1·521	3100	·9538	252. 55	99. 0	319. 25	−18. 40	601
1860.		1	·3285	204. 58	34. 43	255. 8	−22. 3	603
		2	·3361	176. 44	24. 55	245. 20	−22. 42	604
		3	·2611	139. 22	16. 16	236. 41	−14. 17	605
		4	·3795	171. 6	22. 19	242. 44	−25. 2	604
		5	·4563	160. 42	16. 5	236. 30	−28. 19	604

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Jan. 2		3106	·4517	106. 43	0. 31	220. 56	− 9. 41	607
		7	·5093	104. 13	356. 33	216. 58	− 9. 12	607
		8	·6924	126. 2	347. 35	208. 0	−25. 33	609
		9	·7507	122. 14	341. 32	201. 57	−24. 47	609
		3110	·4097	32. 11	14. 2	234. 27	+17. 23	606
		1	·4504	42. 29	8. 45	229. 10	+16. 43	606
		2	·7521	57. 40	344. 20	204. 45	+22. 18	608
		3	·9558	117. 7	314. 19	174. 44	−25. 24	610
7	6·465	4	·8722	244. 0	91. 0	241. 17	−23. 37	604
		5	·8329	237. 3	84. 52	235. 9	−28. 27	604
		6	·6500	259. 5	71. 56	222. 13	− 9. 21	607
		7	·5589	260. 6	65. 24	215. 41	− 8. 8	607
		8	·8111	299. 9	80. 26	230. 43	+21. 26	606
		9	·8053	303. 5	78. 30	228. 47	+24. 8	606
		3120	·5819	302. 50	61. 40	211. 57	+15. 31	608
		1	·5182	306. 21	56. 48	207. 5	+14. 48	608
		2	·5550	321. 19	53. 9	203. 26	+22. 24	608
		3	·6239	123. 30	357. 36	147. 53	−23. 43	611
		4	·6888	122. 3	352. 15	142. 32	−24. 52	611
		5	·8058	71. 31	340. 20	130. 37	+11. 42	612
		6	·9155	76. 6	326. 52	117. 9	+10. 16	612
11	10·462	7	·6044	235. 46	69. 20	163. 55	−21. 48	610
		8	·5778	227. 37	65. 5	158. 40	−25. 10	610
		9	·4371	215. 20	52. 51	146. 26	−24. 1	611
		3130	·3987	205. 34	47. 42	141. 17	−24. 33	611
		1	·2675	351. 28	37. 16	130. 51	+11. 10	612
		2	·3040	13. 1	30. 51	124. 26	+12. 45	612
		3	·3230	26. 44	26. 23	119. 58	+12. 6	612
		4	·3375	37. 52	22. 50	116. 25	+10. 40	612
		5	·8122	118. 55	344. 31	78. 6	−27. 54	614
		6	·6125	100. 9	358. 24	91. 59	−11. 14	613
16	15·478	7	·8309	281. 15	94. 50	117. 16	+10. 51	612
		8	·4924	249. 28	69. 41	92. 7	−11. 34	613
		9	·3519	249. 23	60. 52	83. 16	− 9. 45	613
		3140	·6662	100. 59	359. 42	22. 8	−14. 14	616
		1	·6258	91. 35	2. 8	24. 34	− 7. 54	616
		2	·9087	109. 33	336. 6	358. 32	−24. 24	619
		3	·8918	73. 21	339. 6	1. 32	+ 7. 58	618
17	16·480	4	·9369	278. 9	109. 36	117. 49	+11. 9	612
		5	·6764	252. 28	84. 9	92. 22	−11. 31	613
		6	·5597	253. 30	75. 37	83. 50	−10. 0	613
		7	·4304	92. 31	16. 29	24. 42	− 7. 51	616
		8	·4930	103. 55	13. 34	21. 47	−12. 26	616
		9	·8008	111. 25	350. 32	358. 45	−24. 23	619
		3150	·7552	70. 6	354. 27	2. 40	+ 7. 25	618
		1	·8325	72. 3	346. 56	355. 9	+ 7. 25	618
		2	·7588	53. 40	358. 16	6. 29	+19. 15	617
		3	·7846	55. 33	355. 24	3. 37	+18. 51	617
		4	·8181	54. 22	352. 38	0. 51	+20. 58	617
19	18·554	5	·6157	254. 9	81. 50	60. 39	− 9. 35	615
		6	·0836	207. 59	46. 41	25. 30	− 8. 54	616
		7	·5209	125. 2	18. 42	357. 31	−24. 43	619
		8	·4105	52. 15	23. 16	2. 5	+ 7. 32	618

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Jan. 19		3159	·4616	28. 0	28. 3	6. 52	+17. 26	617
		3160	·5871	36. 35	18. 35	357. 24	+20. 44	617
		1	·5171	60. 18	15. 25	354. 14	+ 7. 16	618
		2	·8923	91. 12	340. 37	319. 26	− 9. 14	622
22	21·456	3	·3864	199. 57	58. 22	356. 1	−25. 1	619
		4	·3569	299. 6	63. 31	1. 10	+ 7. 21	618
		5	·5489	307. 26	70. 44	8. 23	+18. 8	617
		6	·4960	310. 0	67. 6	4. 45	+16. 37	617
		7	·5919	352. 11	46. 48	344. 27	+30. 53	620
		8	·4264	90. 46	21. 48	319. 27	− 8. 27	622
23	22·500	9	·5142	218. 55	72. 34	355. 24	−25. 10	619
		3170	·3483	182. 46	52. 14	335. 4	−25. 12	621
		1	·5408	284. 26	78. 0	0. 50	+ 7. 28	618
		2	·6943	294. 26	85. 36	8. 26	+17. 52	617
		3	·6429	304. 32	78. 10	1. 0	+21. 18	617
		4	·5805	310. 26	72. 0	354. 50	+20. 58	617
		5	·6241	332. 13	61. 50	344. 40	+30. 45	620
		6	·1927	97. 8	37. 12	320. 2	− 8. 12	622
		7	·3275	90. 2	28. 58	311. 48	− 7. 48	622
		8	·9937	104. 58	322. 57	245. 47	−23. 48	627
		9	·9977	99. 54	320. 31	243. 21	−18. 36	627
		3180	·8664	55. 48	352. 30	275. 20	+19. 7	626
		1	·9114	56. 54	346. 29	269. 19	+19. 51	626
24	23·469	2	·6544	227. 58	86. 5	355. 10	−25. 16	619
		3	·7084	277. 45	92. 0	1. 5	+ 7. 42	618
		4	·8256	287. 29	99. 52	8. 57	+18. 4	617
		5	·7421	295. 9	89. 48	358. 53	+20. 23	617
		6	·7047	297. 52	85. 54	354. 49	+20. 33	617
		7	·3808	157. 25	43. 10	312. 15	−27. 0	623
		8	·3955	149. 20	39. 31	308. 36	−26. 47	623
		9	·0634	222. 55	51. 49	320. 54	− 7. 39	622
		3190	·1067	102. 52	43. 14	312. 19	− 7. 39	622
		1	·9370	104. 42	339. 12	248. 17	−23. 56	627
		2	·9465	99. 33	337. 18	246. 23	−19. 9	627
		3	·7382	49. 6	7. 41	276. 46	+18. 57	626
		4	·8188	51. 50	359. 39	268. 44	+20. 5	626
28	27·527	5	·7884	229. 27	102. 53	314. 25	−26. 53	623
		6	·8298	253. 49	109. 19	320. 51	− 7. 49	622
		7	·6022	285. 46	86. 14	297. 46	+10. 41	625
		8	·4279	128. 45	35. 21	246. 53	−24. 21	627
		9	·4101	117. 0	32. 58	244. 30	−19. 50	627
		3200	·5641	117. 44	23. 53	235. 25	−25. 27	627
		1	·6971	65. 22	10. 28	222. 0	+ 5. 29	629
		2	·7861	66. 31	2. 49	214. 21	+ 6. 24	629
		3	·8015	56. 48	3. 31	215. 3	+14. 12	630
		4	·8744	57. 4	355. 51	207. 23	+16. 18	630
		5	·8984	54. 26	353. 35	205. 7	+19. 23	630
30	29·594	6	·9412	241. 36	126. 2	308. 14	−17. 52	624
		7	·7385	284. 42	98. 15	280. 27	+14. 42	626
		8	·3396	192. 38	63. 53	246. 5	−23. 48	627
		9	·2709	191. 26	61. 37	243. 49	−20. 14	627
		3210	·3403	159. 38	51. 52	234. 4	−25. 26	627
		1	·3563	0. 55	50. 40	232. 52	+14. 24	628

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Jan. 30		3212	·3528	46. 21	37. 49	220. 1	+ 5. 9	629
		3	·4412	52. 8	31. 53	214. 5	+ 5. 51	629
		4	·5300	36. 32	31. 11	213. 23	+15. 18	630
		5	·6151	43. 56	23. 38	205. 50	+15. 21	630
		6	·6754	38. 21	21. 47	203. 59	+20. 50	630
		7	·7915	50. 18	8. 13	190. 25	+17. 56	632
Feb. 1	31·501	8	·5961	224. 33	90. 7	245. 17	−24. 3	627
		9	·5552	229. 28	88. 26	243. 36	−20. 21	627
		3220	·4652	211. 34	77. 53	233. 3	−25. 10	627
		1	·5127	301. 6	79. 43	234. 53	+14. 59	628
		2	·4630	308. 26	74. 44	229. 54	+15. 10	628
		3	·2483	308. 44	66. 7	221. 17	+ 5. 8	629
		4	·2051	340. 23	58. 38	213. 48	+ 5. 39	629
		5	·2247	119. 8	47. 9	202. 19	−14. 27	631
		6	·3690	344. 37	58. 19	213. 29	+15. 30	630
		7	·3897	2. 53	51. 4	206. 14	+16. 0	630
		8	·4859	5. 0	48. 14	203. 24	+21. 34	630
		9	·4063	69. 25	33. 31	188. 41	− 2. 11	634
		3230	·5303	27. 50	36. 8	191. 18	+18. 13	632
2	32·501	1	·7414	230. 6	104. 11	245. 10	−24. 3	627
		2	·7098	234. 16	102. 11	243. 10	−20. 31	627
		3	·6060	223. 35	91. 42	232. 41	−24. 43	627
		4	·6619	288. 32	93. 53	234. 52	+15. 4	628
		5	·6114	291. 31	89. 33	230. 32	+14. 51	628
		6	·4284	283. 34	80. 44	221. 43	+ 5. 15	629
		7	·3308	297. 4	72. 54	213. 53	+ 6. 16	629
		8	·1587	193. 35	62. 17	203. 16	−14. 13	631
		9	·1562	158. 19	56. 42	197. 41	−14. 56	631
		3240	·4421	313. 59	72. 42	213. 41	+15. 41	630
		1	·4748	339. 33	62. 5	203. 4	+21. 51	630
		2	·4328	3. 49	50. 44	191. 43	+18. 22	632
		3	·5360	25. 11	37. 50	178. 49	+19. 13	635
		4	·9795	89. 23	339. 0	119. 59	−13. 2	640
6	36·488	5	·8521	241. 53	120. 56	205. 21	−15. 6	631
		6	·7904	240. 31	114. 27	198. 52	−15. 53	631
		7	·6683	241. 6	103. 55	188. 20	−14. 27	633
		8	·6140	240. 51	99. 46	184. 11	−14. 6	633
		9	·9469	263. 10	132. 24	216. 49	+ 4. 54	629
		3250	·9375	274. 44	128. 46	213. 11	+15. 18	630
		1	·8746	284. 26	117. 25	201. 50	+21. 15	630
		2	·5022	309. 28	80. 18	164. 43	+17. 46	636
		3	·5221	318. 11	77. 10	161. 35	+21. 20	636
		4	·4029	21. 17	48. 21	132. 46	+12. 53	638
		5	·4371	26. 36	45. 12	129. 37	+13. 10	638
		6	·4096	93. 24	38. 42	123. 7	−12. 56	640
		7	·5382	89. 40	29. 57	114. 22	−12. 48	640
		8	·6621	91. 37	21. 5	105. 30	−15. 13	640
		9	·6815	49. 47	23. 30	107. 55	+12. 23	641
		3260	·7752	53. 7	15. 7	99. 32	+13. 1	641
		1	·8553	57. 20	6. 18	90. 43	+12. 8	641
9	39·572	2	·6672	223. 33	104. 21	145. 2	−25. 10	637
		3	·9084	279. 32	125. 57	166. 38	+19. 24	636
		4	·2990	226. 2	81. 0	121. 41	−14. 28	640

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Feb. 9		3265	·1498	213. 8	71. 54	112. 35	−12. 8	640
		6	·1594	161. 31	64. 50	105. 31	−15. 38	640
		7	·3570	333. 48	69. 16	109. 57	+13. 56	641
		8	·3528	1. 15	59. 24	100. 5	+13. 11	641
		9	·3926	20. 36	51. 44	92. 25	+12. 6	641
		3270	·5012	29. 49	43. 51	84. 32	+14. 31	641
		1	·7187	106. 5	22. 9	62. 50	−26. 49	643
		2	·8131	77. 56	10. 47	50. 28	− 6. 32	644
12	42·545	3	·8167	244. 11	123. 27	121. 58	−11. 27	640
		4	·7732	240. 30	119. 10	117. 41	−14. 15	640
		5	·6835	242. 25	111. 33	110. 4	−12. 25	640
		6	·6374	238. 35	107. 43	106. 14	−14. 36	640
		7	·8851	282. 20	124. 42	123. 13	+21. 37	639
		8	·7413	279. 58	111. 26	109. 57	+14. 25	641
		9	·6265	283. 36	101. 58	100. 29	+12. 44	641
		3280	·5061	301. 15	88. 58	87. 29	+15. 41	641
		1	·6908	44. 24	29. 59	28. 30	+14. 23	646
		2	·7862	45. 37	21. 56	20. 27	+16. 58	646
13	43·460	3	·9271	240. 52	137. 57	123. 29	−13. 54	640
		4	·8716	241. 2	130. 24	115. 56	−13. 51	640
		5	·7720	238. 51	119. 55	105. 27	−15. 17	640
		6	·9328	278. 29	133. 24	118. 56	+20. 40	641
		7	·8493	274. 39	123. 43	109. 15	+14. 14	641
		8	·7715	276. 23	115. 50	101. 22	+13. 5	641
		9	·6345	288. 35	101. 41	87. 13	+15. 51	641
		3290	·5659	288. 21	97. 31	83. 3	+13. 4	641
		1	·7080	8. 27	48. 8	33. 40	+33. 26	645
		2	·7536	11. 54	43. 3	28. 35	+35. 15	645
		3	·5402	33. 11	44. 8	29. 40	+14. 11	646
		4	·6685	38. 54	34. 14	19. 46	+16. 35	646
		5	·8754	82. 1	7. 45	353. 17	−10. 58	647
15	45·540	6	·9633	238. 13	146. 48	102. 50	−15. 31	640
		7	·8684	271. 21	128. 34	84. 36	+12. 41	641
		8	·6385	284. 15	105. 16	61. 18	+13. 58	642
		9	·3571	334. 33	74. 18	30. 20	+13. 50	646
		3300	·4172	0. 24	63. 44	19. 46	+16. 33	646
		1	·6407	334. 8	77. 42	33. 44	+32. 25	645
		2	·6837	344. 28	69. 42	25. 44	+36. 7	645
		3	·4909	80. 4	41. 58	358. 0	− 9. 38	647
		4	·5634	82. 59	37. 8	353. 10	−11. 31	647
17	47·525	5	·9030	270. 56	134. 44	62. 36	+13. 58	642
		6	·5854	286. 54	102. 49	30. 41	+13. 38	646
		7	·5339	289. 36	98. 57	26. 49	+12. 50	646
		8	·5063	304. 25	92. 7	19. 59	+17. 7	646
		9	·7645	305. 12	105. 50	33. 42	+32. 0	645
		3310	·7597	314. 37	98. 49	26. 41	+36. 12	645
		1	·0579	134. 30	71. 53	359. 45	− 9. 48	647
		2	·1523	103. 25	65. 51	353. 43	−11. 22	647
20	50·432	3	·9216	267. 1	140. 56	27. 34	+11. 54	646
		4	·8776	274. 30	133. 20	19. 58	+16. 50	646
		5	·4076	230. 28	99. 30	346. 8	−14. 34	647
		6	·3397	221. 16	94. 12	340. 50	−16. 16	647
		7	·9709	286. 28	144. 53	31. 31	+32. 2	645

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Feb. 20		3318	·9452	289. 52	137. 45	24. 23	+33. 18	645
		9	·9450	293. 25	136. 4	22. 42	+36. 22	645
		3320	·9376	295. 51	133. 24	20. 2	+37. 53	645
		1	·9858	94. 13	354. 11	240. 49	−24. 5	650
		2	·9700	86. 47	359. 16	245. 54	−17. 4	649
22	52·584	3	·7826	237. 35	130. 19	346. 25	−14. 15	647
		4	·4661	333. 5	82. 6	298. 12	+20. 25	648
		5	·4805	349. 37	73. 46	289. 52	+21. 10	648
		6	·7458	87. 39	30. 27	246. 33	−17. 36	649
		7	·8164	94. 48	24. 23	240. 29	−24. 1	650
23	53·541	8	·5311	308. 42	96. 31	299. 3	+20. 9	648
		9	·4869	325. 36	86. 55	289. 27	+21. 2	648
		3330	·5890	90. 18	44. 16	246. 48	−17. 34	649
		1	·6893	97. 34	37. 46	240. 18	−23. 54	650
24	54·490	2	·6412	293. 18	109. 59	299. 4	+20. 2	648
		3	·5573	306. 5	99. 41	288. 46	+20. 53	648
		4	·3850	96. 53	59. 38	248. 43	−16. 43	649
		5	·4229	97. 12	57. 24	246. 29	−17. 44	649
		6	·5539	103. 39	50. 24	239. 29	−24. 7	650
		7	·9819	81. 52	0. 22	189. 27	−13. 15	651
		8	·9763	80. 26	2. 6	191. 11	−11. 58	651
27	57·500	9	·9859	265. 8	161. 18	307. 42	+14. 37	648
		3340	·9623	272. 27	153. 27	299. 51	+20. 19	648
		1	·9226	277. 35	144. 51	291. 15	+23. 0	648
		2	·3781	224. 4	104. 20	250. 44	−15. 45	649
		3	·3338	213. 53	100. 9	246. 33	−17. 49	649
		4	·3270	183. 20	92. 2	238. 26	−24. 17	650
		5	·6052	79. 11	46. 13	192. 37	−11. 54	651
		6	·6518	81. 36	42. 51	189. 15	−13. 40	651
		7	·8672	72. 36	23. 9	169. 33	− 6. 47	653
		8	·7995	37. 37	37. 11	183. 35	+19. 36	652
		9	·9094	44. 40	22. 43	169. 7	+18. 29	654
		3350	·9205	47. 42	20. 20	166. 44	+16. 16	654
		1	·9586	43. 59	14. 43	161. 7	+21. 20	654
29	59·495	2	·6790	229. 1	127. 46	245. 51	−18. 17	649
		3	·5968	215. 13	118. 50	236. 55	−24. 59	650
		4	·1890	90. 43	75. 18	193. 23	−11. 8	651
		5	·2736	91. 49	70. 38	188. 43	−13. 8	651
		6	·5265	15. 45	65. 57	184. 2	+17. 54	652
		7	·6172	19. 40	59. 43	177. 48	+21. 7	652
		8	·5652	70. 14	50. 58	169. 3	− 6. 57	653
		9	·6908	31. 19	50. 2	168. 7	+18. 44	654
		3360	·6495	34. 4	51. 48	169. 53	+15. 29	654
		1	·7871	33. 43	41. 35	159. 40	+21. 27	654
Mar. 1	60·576	2	·8341	231. 14	143. 28	246. 13	−17. 57	649
		3	·7556	221. 43	134. 29	237. 14	−24. 27	650
		4	·1119	208. 34	91. 40	194. 25	−11. 12	651
		5	·1000	158. 40	86. 42	189. 27	−12. 52	651
		6	·3374	68. 25	66. 52	169. 37	− 6. 51	653
		7	·4387	346. 50	82. 37	185. 22	+18. 27	652
		8	·5574	1. 54	72. 28	175. 13	+23. 36	652
		9	·4188	24. 32	68. 46	171. 31	+ 9. 54	654
		3370	·4953	17. 31	67. 39	170. 24	+15. 39	654

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Mar. 1		3371	·5563	16. 31	65. 16	168. 1	+19. 5	654
		2	·6606	22. 35	56. 50	159. 35	+21. 50	654
		3	·9422	78. 47	15. 26	118. 11	−12. 27	656
		4	·9780	82. 56	7. 27	110. 12	−15. 58	656
		5	·9383	41. 43	22. 4	124. 49	+21. 40	655
2	61·636	6	·9355	230. 46	157. 57	245. 40	−18. 27	649
		7	·8818	223. 42	149. 43	237. 26	−24. 35	650
		8	·3226	233. 42	106. 14	193. 57	−11. 17	651
		9	·2537	224. 10	101. 26	189. 9	−12. 47	651
		3380	·4709	321. 50	95. 36	183. 19	+19. 42	652
		1	·4767	334. 21	89. 29	177. 12	+21. 8	652
		2	·1103	67. 29	81. 22	169. 5	− 7. 5	653
		3	·2967	349. 29	84. 14	171. 57	+ 9. 40	654
		4	·4051	352. 54	81. 27	169. 10	+15. 48	654
		5	·4619	355. 36	79. 11	166. 54	+18. 54	654
		6	·5512	6. 28	71. 13	158. 56	+21. 57	654
		7	·6659	73. 52	45. 44	133. 27	− 9. 21	656
		8	·9165	81. 56	20. 31	108. 14	−15. 46	656
		9	·8699	87. 46	26. 55	114. 38	−20. 50	656
		3390	·8489	77. 44	29. 8	116. 51	−12. 11	656
		1	·8516	37. 10	36. 2	123. 45	+21. 21	655
5	64·440	2	·7645	235. 37	140. 42	188. 39	−13. 26	651
		3	·5119	246. 32	121. 24	169. 21	− 6. 29	653
		4	·7823	279. 57	134. 47	182. 44	+19. 56	652
		5	·6339	287. 5	121. 8	169. 5	+17. 47	654
		6	·6197	290. 38	118. 49	166. 46	+18. 51	654
		7	·5118	84. 40	60. 19	108. 16	−15. 2	656
		8	·5311	3. 38	75. 53	123. 50	+21. 21	655
		9	·6089	8. 31	70. 15	118. 12	+24. 31	655
		3400	·9159	70. 0	24. 1	71. 58	− 5. 28	659
		1	·9163	43. 17	28. 42	76. 39	+18. 29	658
6	65·459	2	·8912	233. 39	155. 15	188. 44	−15. 5	651
		3	·9029	237. 38	156. 42	190. 11	−11. 29	651
		4	·6997	245. 15	136. 6	169. 35	− 6. 19	653
		5	·8866	274. 10	148. 27	181. 56	+20. 5	652
		6	·7707	277. 16	135. 43	169. 12	+17. 45	654
		7	·7508	280. 21	132. 57	166. 26	+19. 2	654
		8	·1499	163. 36	92. 36	126. 5	−15. 41	656
		9	·2940	118. 53	80. 28	112. 57	−20. 21	656
		3410	·3073	93. 18	75. 6	108. 35	−14. 41	656
		1	·5509	349. 36	83. 56	117. 25	+25. 17	655
		2	·7945	68. 6	38. 52	72. 21	− 5. 16	659
		3	·8152	37. 35	43. 6	76. 35	+18. 50	658
		4	·9730	40. 3	19. 58	53. 27	+24. 1	661
8	67·624	5	·9504	242. 2	165. 57	168. 44	− 6. 28	653
		6	·9601	267. 26	163. 50	166. 37	+17. 43	654
		7	·9467	268. 44	160. 55	163. 42	+18. 18	654
		8	·2494	213. 45	106. 13	109. 0	−14. 42	656
		9	·6464	295. 12	121. 10	123. 57	+22. 38	655
		3420	·5661	306. 10	111. 41	114. 28	+22. 20	655
		1	·3996	117. 45	77. 48	80. 35	−24. 58	657
		2	·6819	95. 30	52. 52	55. 39	−24. 43	660
		3	·4711	60. 27	65. 53	68. 40	− 3. 29	659

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Mar. 8		3424	·5411	13. 5	73. 54	76. 41	+18. 57	658
		5	·7983	29. 22	49. 54	52. 41	+23. 41	661
		6	·8631	30. 2	43. 8	45. 55	+26. 24	661
		7	·9463	50. 29	25. 14	28. 1	+12. 36	663
		8	·9673	76. 39	17. 37	20. 24	−11. 35	664
10	69·519	9	·7456	226. 48	143. 34	119. 28	−19. 6	656
		3430	·6129	231. 21	133. 15	109. 9	−14. 40	656
		1	·5004	230. 13	125. 15	101. 9	−14. 5	656
		2	·8836	272. 4	152. 36	128. 30	+18. 54	655
		3	·8417	279. 11	145. 24	121. 18	+22. 46	655
		4	·4132	221. 34	118. 36	94. 30	−16. 26	656
		5	·3768	215. 4	115. 23	91. 17	−17. 54	656
		6	·3352	182. 47	105. 6	81. 0	−24. 24	657
		7	·3371	171. 57	101. 29	77. 23	−25. 56	657
		8	·4501	324. 38	101. 4	76. 58	+18. 57	658
		9	·3924	122. 30	81. 43	57. 37	−25. 55	660
		3440	·5955	6. 47	76. 20	52. 14	+23. 59	661
		1	·6645	10. 35	70. 52	46. 46	+26. 40	661
		2	·7611	74. 24	45. 46	21. 40	−10. 54	664
		3	·8305	75. 36	39. 4	14. 58	−11. 48	664
		4	·7373	41. 42	52. 23	28. 17	+12. 34	663
		5	·7727	44. 45	48. 36	24. 30	+11. 31	663
		6	·8444	37. 25	44. 2	19. 56	+19. 33	663
13	72·446	7	·9631	232. 26	173. 58	108. 21	−14. 34	656
		8	·8917	231. 18	162. 18	96. 41	−15. 57	656
		9	·8525	228. 21	157. 26	90. 49	−18. 24	656
		3450	·7663	277. 6	141. 58	76. 21	+18. 26	658
		1	·7177	283. 29	135. 40	70. 3	+20. 27	658
		2	·5904	307. 20	116. 25	50. 48	+24. 28	661
		3	·2296	85. 15	85. 55	20. 18	−11. 19	664
		4	·3446	83. 1	78. 59	13. 22	−12. 34	664
		5	·3360	349. 39	93. 50	28. 13	+11. 52	663
		6	·3568	2. 40	89. 7	23. 30	+11. 28	663
		7	·4963	1. 16	85. 28	19. 51	+19. 34	663
		8	·9664	90. 47	22. 3	316. 26	−26. 4	669
		9	·9498	87. 20	25. 42	320. 5	−22. 47	669
		3460	·7944	26. 33	55. 56	350. 19	+24. 51	667
		1	·8423	28. 53	50. 19	344. 42	+25. 35	667
15	74·490	2	·8855	246. 19	162. 48	68. 11	− 2. 24	659
		3	·7944	235. 33	153. 36	58. 59	−12. 0	659
		4	·9606	267. 2	170. 40	76. 3	+18. 32	658
		5	·9224	269. 12	163. 25	68. 48	+18. 49	658
		6	·4836	288. 24	121. 46	27. 9	+12. 39	663
		7	·2560	230. 4	115. 8	20. 31	−10. 40	664
		8	·1576	211. 3	108. 15	13. 38	−12. 3	664
		9	·5914	359. 32	85. 4	350. 27	+25. 43	667
		3470	·6728	5. 29	77. 59	343. 22	+28. 58	667
		1	·5065	20. 54	78. 49	344. 12	+14. 9	666
		2	·9558	40. 43	32. 18	297. 41	+20. 57	670
18	77·593	3	·9219	227. 1	171. 43	33. 5	−19. 6	662
		4	·8664	224. 33	164. 2	25. 24	−21. 1	662
		5	·8197	236. 20	159. 11	20. 33	−10. 57	664
		6	·5208	218. 59	133. 21	354. 43	−19. 10	665

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Mar. 18		3477	·5589	282. 2	130. 53	352. 15	+13. 29	666
		8	·2968	140. 33	99. 10	320. 32	−23. 35	669
		9	·3545	128. 41	93. 50	315. 12	−25. 20	669
		3480	·6375	19. 50	75. 4	296. 26	+20. 38	670
22	81·585	1	·7987	240. 6	160. 59	325. 44	− 7. 31	668
		2	·7420	236. 5	155. 53	320. 38	−10. 43	668
		3	·5687	295. 55	129. 46	294. 31	+20. 2	670
		4	·4778	38. 37	82. 13	246. 58	+ 5. 47	671
		5	·6375	33. 3	73. 47	238. 32	+13. 39	673
		6	·7150	35. 20	67. 33	232. 18	+15. 4	673
		7	·8056	33. 52	60. 29	225. 14	+19. 31	673
		8	·8937	76. 1	43. 50	208. 35	−13. 26	674
24	83·567	9	·8679	273. 51	163. 41	300. 19	+21. 31	670
		3490	·8117	274. 59	157. 27	294. 5	+20. 2	670
		1	·3380	148. 17	107. 30	244. 8	−26. 18	672
		2	·2196	323. 36	112. 1	248. 39	+ 5. 40	671
		3	·2118	340. 4	108. 28	245. 6	+ 5. 22	671
		4	·3741	356. 23	101. 24	238. 2	+13. 30	673
		5	·6220	77. 24	71. 22	208. 0	−13. 29	674
		6	·7999	85. 1	56. 54	193. 32	−20. 39	674
		7	·9570	68. 51	36. 16	172. 54	− 6. 25	677
		8	·9044	41. 23	49. 6	185. 44	+17. 16	675
25	84·467	9	·9022	270. 22	169. 57	293. 49	+20. 11	670
		3500	·3949	184. 4	123. 17	247. 9	−26. 29	672
		1	·3794	174. 32	119. 9	243. 1	−27. 23	672
		2	·3306	284. 26	125. 13	249. 5	+ 5. 48	671
		3	·3447	323. 58	114. 10	238. 2	+13. 3	673
		4	·4472	81. 12	84. 38	208. 30	−13. 35	674
		5	·6661	87. 45	70. 6	193. 58	−20. 36	674
		6	·8710	85. 32	49. 56	173. 48	−21. 54	679
		7	·8790	67. 49	48. 52	172. 44	− 6. 28	677
		8	·7568	34. 19	67. 20	191. 12	+17. 11	675
		9	·8219	36. 20	60. 50	184. 42	+18. 12	675
		3510	·9616	41. 47	40. 24	164. 16	+19. 15	678
26	85·453	1	·9682	266. 41	183. 14	293. 7	+19. 54	670
		2	·5320	202. 18	137. 51	247. 44	−26. 40	672
		3	·4797	191. 24	130. 53	240. 46	−28. 38	672
		4	·4951	267. 3	138. 42	248. 35	+ 5. 11	671
		5	·4345	293. 35	128. 19	238. 12	+12. 51	673
		6	·4540	322. 42	117. 0	226. 53	+19. 41	673
		7	·2604	95. 18	98. 22	208. 15	−14. 14	674
		8	·4859	86. 58	83. 51	193. 44	−16. 48	674
		9	·7791	87. 19	61. 10	171. 3	−22. 13	679
		3520	·6198	24. 38	81. 35	191. 28	+17. 20	675
		1	·6881	29. 57	75. 5	184. 58	+17. 17	675
		2	·9414	86. 48	40. 29	150. 22	−23. 38	679
		3	·7487	66. 58	62. 58	172. 51	− 6. 37	677
		4	·8882	38. 13	53. 55	163. 48	+19. 15	678
29	88·633	5	·9122	217. 58	180. 41	245. 28	−26. 11	672
		6	·8650	214. 35	173. 39	238. 26	−28. 26	672
		7	·8401	265. 4	168. 19	233. 6	+13. 52	673
		8	·7720	269. 27	160. 40	225. 27	+14. 58	673
		9	·4802	227. 20	142. 54	207. 41	−13. 34	674

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Mar. 29		3530	·2928	229. 52	131. 27	196. 14	−10. 16	674
		1	·4482	307. 5	126. 52	191. 39	+17. 8	675
		2	·4129	323. 5	119. 21	184. 8	+17. 20	675
		3	·1561	317. 22	117. 16	182. 3	+ 2. 4	676
		4	·3409	118. 29	102. 29	167. 16	−22. 27	679
		5	·5229	6. 40	97. 17	162. 4	+19. 45	678
Apr. 1	91·579	6	·9161	232. 28	184. 33	207. 33	−12. 49	674
		7	·7841	229. 13	169. 21	192. 21	−15. 15	674
		8	·8227	270. 0	168. 4	191. 4	+17. 21	675
		9	·7415	274. 33	159. 24	182. 24	+17. 36	675
		3540	·5151	209. 3	144. 53	167. 53	−22. 38	679
		1	·4861	245. 7	146. 43	169. 43	− 4. 52	677
		2	·4932	323. 59	122. 49	145. 49	+22. 38	680
		3	·5086	330. 45	119. 17	142. 17	+24. 2	680
		4	·8038	72. 13	63. 55	86. 55	−10. 38	683
		5	·8539	65. 3	59. 0	82. 0	− 4. 29	683
3	93·628	6	·8143	220. 10	173. 30	167. 26	−22. 38	679
		7	·7773	215. 28	168. 57	162. 53	−25. 37	679
		8	·8364	246. 22	176. 9	170. 5	− 1. 10	677
		9	·8305	242. 2	175. 53	169. 49	− 4. 49	677
		3550	·9811	262. 49	195. 37	189. 33	+17. 22	675
		1	·9386	264. 23	186. 5	180. 1	+16. 59	675
		2	·4663	217. 42	145. 38	139. 34	−17. 20	681
		3	·5208	62. 13	88. 21	82. 17	− 4. 36	683
4	94·597	4	·9151	221. 46	187. 11	167. 22	−22. 27	679
		5	·8568	217. 21	178. 50	159. 1	−25. 35	679
		6	·9404	244. 38	190. 31	170. 42	− 1. 11	677
		7	·9294	240. 55	189. 4	169. 15	− 4. 47	677
		8	·9866	261. 50	198. 35	178. 46	+16. 45	675
		9	·2140	78. 44	108. 37	88. 48	− 9. 13	683
		3560	·2828	77. 41	104. 33	84. 44	− 9. 52	683
		1	·3198	58. 25	102. 6	82. 17	− 4. 12	683
		2	·5712	86. 21	87. 11	67. 22	−17. 53	684
		3	·9773	41. 31	46. 21	26. 32	+20. 0	687
		4	·9588	72. 45	46. 37	26. 48	−10. 30	686
6	96·579	5	·8948	227. 1	186. 25	138. 29	−17. 31	681
		6	·8312	223. 33	178. 33	130. 37	−19. 59	681
		7	·1407	253. 17	130. 34	82. 38	− 4. 38	683
		8	·8098	33. 9	74. 44	26. 48	+20. 11	687
		9	·9529	83. 55	49. 30	1. 34	−21. 9	688
7	97·458	3570	·3895	247. 32	146. 17	85. 53	− 4. 0	683
		1	·3458	247. 37	143. 37	83. 13	− 4. 15	683
		2	·4544	21. 33	103. 23	42. 59	+12. 2	685
		3	·4969	22. 45	100. 50	40. 26	+13. 23	685
		4	·6996	26. 4	87. 20	26. 56	+20. 21	687
		5	·7407	35. 58	80. 40	20. 16	+15. 41	687
		6	·8738	84. 28	62. 39	2. 15	−21. 5	688
		7	·8684	43. 59	66. 19	5. 55	+13. 44	689
9	99·469	8	·8658	271. 58	179. 55	90. 59	+20. 53	682
		9	·8424	274. 52	176. 21	87. 25	+22. 12	682
		3580	·4476	320. 45	131. 31	42. 35	+19. 56	685
		1	·4636	353. 49	115. 42	26. 46	+19. 55	687
		2	·4052	2. 16	113. 54	24. 58	+15. 1	687

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Apr. 9		3583	·4494	10. 36	109. 15	20. 19	+15. 21	687
		4	·5130	14. 20	105. 1	16. 5	+17. 20	687
		5	·6156	92. 1	89. 56	1. 0	−21. 45	688
		6	·5987	27. 50	95. 20	6. 24	+15. 24	689
		7	·7081	39. 59	84. 3	355. 7	+12. 6	689
		8	·8122	29. 28	78. 40	349. 44	+23. 8	690
10	100·597	9	·9639	268. 4	197. 8	92. 12	+21. 37	682
		3590	·5126	292. 7	147. 18	42. 22	+17. 5	685
		1	·5413	295. 14	147. 24	42. 28	+19. 36	685
		2	·4355	323. 9	131. 22	26. 26	+19. 30	687
		3	·3593	324. 2	130. 6	25. 10	+14. 54	687
		4	·3686	336. 3	125. 39	20. 43	+15. 45	687
		5	·4079	348. 20	120. 22	15. 26	+17. 24	687
		6	·4321	106. 28	106. 35	1. 39	−22. 26	688
		7	·3450	95. 31	108. 53	3. 57	−15. 57	688
		8	·4577	9. 20	110. 29	5. 33	+16. 12	689
		9	·5102	23. 27	103. 0	358. 4	+13. 53	689
		3600	·5343	30. 7	99. 36	354. 40	+11. 59	689
		1	·6872	19. 38	94. 3	349. 7	+23. 36	690
15	105·540	2	·9415	262. 25	198. 59	23. 57	+15. 22	687
		3	·9487	265. 46	199. 35	24. 33	+18. 43	687
		4	·7562	226. 27	180. 3	5. 1	−16. 41	688
		5	·7206	219. 10	175. 52	0. 50	−21. 23	688
		6	·6909	214. 47	172. 28	357. 26	−23. 42	688
		7	·7359	268. 44	174. 44	359. 42	+14. 2	689
		8	·6749	268. 31	170. 7	355. 5	+12. 4	689
		9	·6224	276. 1	164. 19	349. 17	+14. 44	691
		3610	·5627	280. 59	158. 59	343. 57	+14. 59	691
		1	·5857	14. 47	107. 13	292. 11	+21. 18	692
		2	·9583	89. 35	57. 33	242. 31	−26. 6	696
		3	·9764	50. 3	55. 42	240. 40	+12. 15	697
16	106·556	4	·8454	221. 8	189. 23	359. 56	−22. 5	688
		5	·9875	259. 54	211. 17	21. 50	+14. 43	687
		6	·7646	268. 26	178. 14	348. 47	+14. 44	691
		7	·7162	271. 17	173. 29	344. 2	+15. 8	691
		8	·4789	355. 48	121. 27	292. 0	+21. 5	692
		9	·9116	91. 49	67. 19	237. 52	−27. 28	696
		3620	·7962	77. 51	79. 43	250. 16	−14. 13	695
		1	·9052	47. 43	69. 49	240. 22	+12. 16	697
		2	·9682	42. 20	60. 4	230. 37	+19. 23	697
17	107·485	3	·8793	264. 19	191. 45	349. 7	+14. 59	691
		4	·4436	330. 49	134. 50	292. 12	+20. 57	692
		5	·6471	80. 3	93. 32	250. 54	−14. 16	695
		6	·7246	79. 50	87. 17	244. 39	−14. 59	695
		7	·8181	94. 15	80. 39	238. 1	−27. 28	696
		8	·8018	44. 7	82. 57	240. 19	+12. 32	697
		9	·9010	39. 43	73. 8	230. 30	+19. 14	697
18	108·512	3630	·9549	262. 15	204. 30	347. 18	+15. 33	691
		1	·4938	305. 8	149. 4	291. 52	+20. 30	692
		2	·6159	99. 36	100. 46	243. 34	−25. 10	696
		3	·7066	99. 1	93. 34	236. 22	−27. 41	696
		4	·4696	85. 28	107. 34	250. 22	−14. 23	695
		5	·5850	84. 41	99. 42	242. 30	−16. 3	695

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Apr. 18		3636	·6528	38. 5	97. 33	240. 21	+12. 31	697
		7	·7977	34. 49	86. 56	229. 44	+19. 30	697
		8	·9299	74. 54	65. 34	208. 22	−11. 52	698
21	111·363	9	·5732	215. 42	169. 18	271. 40	−20. 6	693
		3640	·5384	210. 15	165. 38	268. 0	−21. 51	693
		1	·5206	230. 49	168. 0	270. 22	−11. 14	694
		2	·2452	203. 57	148. 7	250. 29	−13. 56	695
		3	·1944	168. 47	139. 56	242. 18	−15. 42	695
		4	·3589	163. 14	140. 33	242. 55	−25. 34	696
		5	·4049	142. 18	131. 34	233. 56	−28. 5	696
		6	·3117	335. 56	136. 36	238. 58	+13. 11	697
		7	·4548	356. 21	126. 43	229. 5	+20. 2	697
		8	·5274	79. 7	105. 48	208. 10	−11. 50	698
		9	·5978	81. 17	101. 7	203. 29	−13. 55	698
22	112·556	3650	·7636	221. 28	186. 40	272. 7	−20. 37	693
		1	·7150	217. 50	181. 41	267. 8	−22. 13	693
		2	·4031	294. 1	153. 48	239. 15	+13. 9	697
		3	·4316	323. 3	143. 30	228. 57	+20. 8	697
		4	·9215	52. 28	72. 36	158. 3	+ 9. 11	700
25	115·581	5	·9439	223. 26	211. 56	254. 28	−21. 48	696
		6	·8469	263. 13	196. 33	239. 5	+12. 48	697
		7	·7710	276. 40	185. 31	228. 3	+20. 38	697
		8	·3674	333. 14	141. 51	184. 23	+16. 56	699
		9	·4878	38. 12	115. 10	157. 42	+ 8. 36	700
		3660	·5762	34. 46	110. 36	153. 8	+12. 55	700
		1	·7340	77. 7	94. 12	136. 44	−11. 57	701
		2	·8996	77. 12	76. 57	119. 29	−12. 57	704
28	118·595	3	·1821	115. 17	137. 15	137. 2	−12. 9	701
		4	·2467	97. 10	131. 48	131. 35	−11. 32	701
		5	·4017	91. 24	122. 21	122. 8	−14. 0	704
		6	·5322	92. 20	114. 23	114. 10	−17. 33	704
		7	·8799	36. 50	87. 31	87. 18	+22. 35	707
		8	·9632	39. 30	73. 26	73. 13	+23. 33	707
29	119·535	9	·1741	193. 19	151. 15	137. 42	−11. 59	701
		3670	·2347	104. 56	134. 21	120. 48	−12. 34	704
		1	·3683	106. 38	128. 7	114. 34	−17. 53	704
		2	·3698	347. 35	140. 26	126. 53	+17. 0	703
		3	·3905	355. 34	137. 1	123. 28	+17. 21	703
		4	·5995	34. 31	113. 8	99. 35	+14. 28	705
		5	·7714	31. 38	101. 21	87. 48	+22. 30	707
		6	·8950	36. 25	86. 37	73. 4	+23. 42	707
30	120·506	7	·3587	220. 37	165. 18	137. 59	−12. 32	701
		8	·1711	165. 9	147. 36	120. 17	−13. 42	704
		9	·2547	139. 51	141. 46	114. 27	−18. 8	704
		3680	·3876	314. 41	154. 19	127. 0	+17. 7	703
		1	·3746	324. 59	150. 9	122. 50	+17. 29	703
		2	·4367	21. 47	127. 10	99. 51	+13. 46	705
		3	·6440	23. 5	115. 18	87. 59	+22. 21	707
		4	·7965	32. 14	99. 51	72. 32	+23. 16	707
May 1	121·387	5	·8073	261. 8	198. 50	159. 1	+ 9. 47	700
		6	·5339	228. 38	178. 9	138. 20	−12. 28	701
		7	·5025	206. 37	171. 30	131. 41	−22. 4	702
		8	·2999	211. 24	161. 28	121. 39	−13. 33	704

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
		3689	·2249	194. 10	155. 1	115. 12	−14. 2	704
May 1		3690	·6118	349. 13	137. 15	97. 26	+32. 30	706
		1	·6397	353. 25	133. 30	93. 41	+33. 37	706
		2	·3276	357. 5	139. 51	100. 2	+13. 48	705
		3	·5381	10. 12	127. 44	87. 55	+22. 35	707
		4	·6933	25. 44	111. 44	71. 55	+23. 17	707
2	122·525	5	·7305	232. 19	194. 21	138. 24	−12. 40	701
		6	·6876	218. 43	188. 40	132. 43	−21. 19	702
		7	·5361	226. 1	179. 0	123. 3	−13. 52	704
		8	·4242	220. 45	171. 4	115. 7	−13. 57	704
		9	·6011	327. 2	154. 22	98. 25	+32. 27	706
		3700	·6244	336. 58	147. 17	91. 20	+34. 39	706
		1	·4449	335. 58	147. 59	92. 2	+22. 28	707
		2	·4475	347. 42	142. 22	86. 25	+22. 5	707
		3	·4780	357. 16	137. 12	81. 15	+22. 37	707
		4	·5581	11. 41	127. 18	71. 21	+23. 20	707
		5	·7898	38. 56	100. 17	44. 20	+18. 33	709
		6	·9305	47. 22	81. 47	25. 50	+15. 52	709
		7	·9371	77. 5	78. 15	22. 18	−11. 39	710
3	123·660	8	·8817	234. 38	210. 45	138. 42	−12. 4	701
		9	·8433	223. 31	205. 14	133. 11	−21. 9	702
		3710	·7399	231. 10	196. 6	124. 3	−13. 41	704
		1	·6247	228. 53	186. 40	114. 37	−13. 43	704
		2	·6710	307. 32	171. 28	99. 25	+32. 27	706
		3	·6477	321. 18	160. 48	88. 45	+34. 56	706
		4	·5084	307. 30	164. 22	92. 19	+22. 45	707
		5	·4677	317. 15	158. 30	86. 27	+22. 27	707
		6	·4745	347. 55	143. 3	71. 0	+23. 54	707
		7	·3688	39. 21	129. 47	57. 44	+ 6. 6	708
		8	·4296	46. 25	125. 11	53. 8	+ 5. 0	708
		9	·6378	30. 0	116. 13	44. 10	+19. 2	709
		3720	·7039	32. 25	110. 41	38. 38	+20. 10	709
		1	·8215	44. 23	96. 55	24. 52	+15. 36	709
		2	·8216	77. 45	93. 57	21. 54	−11. 27	710
		3	·9102	77. 45	83. 29	11. 26	−11. 54	710
4	124·496	4	·9527	234. 55	222. 13	138. 18	−12. 9	701
		5	·8522	233. 12	207. 59	124. 4	−13. 13	704
		6	·7550	231. 28	198. 14	114. 19	−13. 42	704
		7	·7438	297. 2	183. 34	99. 39	+31. 55	706
		8	·7097	308. 14	174. 3	90. 8	+35. 14	706
		9	·5925	292. 7	176. 12	92. 17	+21. 42	707
		3730	·5387	299. 10	170. 21	86. 26	+21. 52	707
		1	·4591	326. 37	154. 43	70. 48	+23. 10	707
		2	·5191	19. 25	127. 58	44. 3	+18. 55	709
		3	·5677	21. 44	124. 29	40. 34	+20. 13	709
		4	·7033	40. 15	109. 8	25. 13	+15. 21	709
		5	·1731	9. 21	144. 26	60. 31	+ 4. 43	708
		6	·2740	33. 29	136. 32	52. 37	+ 5. 2	708
		7	·6963	79. 18	106. 8	22. 13	−11. 27	710
		8	·8067	78. 39	96. 18	12. 23	−11. 53	710
5	125·492	9	·9470	233. 37	222. 4	124. 2	−13. 33	704
		3740	·6737	267. 13	190. 36	92. 34	+10. 53	705
		1	·7257	282. 17	190. 14	92. 12	+22. 11	707

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
		3742	·6608	286. 13	183. 58	85. 56	+21. 50	707
May 5		3	·8425	289. 23	197. 48	99. 46	+32. 21	706
		4	·7731	298. 57	185. 49	87. 47	+34. 41	706
		5	·2054	285. 28	159. 58	61. 56	+ 3. 53	708
		6	·1463	337. 40	150. 38	52. 36	+ 4. 51	708
		7	·4092	358. 41	141. 31	43. 29	+18. 44	709
		8	·4649	4. 7	137. 36	39. 34	+20. 51	709
		9	·5552	32. 22	122. 33	24. 31	+15. 6	709
		3750	·5256	83. 30	119. 58	21. 56	−11. 43	710
		1	·6544	80. 20	110. 28	12. 26	−11. 30	710
		2	·9110	49. 51	87. 9	349. 7	+13. 46	712
		3	·9405	38. 59	84. 46	346. 44	+24. 32	711
6	126·553	4	·8409	261. 11	207. 26	94. 20	+ 9. 59	705
		5	·8040	264. 59	203. 4	89. 58	+12. 14	705
		6	·7993	278. 0	199. 13	86. 7	+21. 59	707
		7	·9231	285. 1	211. 38	98. 32	+32. 57	706
		8	·8500	292. 5	198. 27	85. 21	+34. 38	706
		9	·6550	291. 22	182. 38	69. 32	+24. 10	707
		3760	·4341	262. 28	176. 27	63. 21	+ 3. 32	708
		1	·2713	278. 23	165. 10	52. 4	+ 4. 47	708
		2	·3782	324. 39	156. 38	43. 32	+18. 12	709
		3	·4202	335. 46	152. 20	39. 14	+21. 20	709
		4	·3948	12. 58	137. 56	24. 50	+15. 14	709
		5	·3206	92. 55	134. 46	21. 40	−11. 17	710
		6	·7596	33. 12	108. 52	355. 46	+22. 26	711
		7	·7940	46. 52	101. 53	348. 47	+13. 37	712
		8	·8549	35. 4	98. 54	345. 48	+24. 46	711
7	127·485	9	·9427	258. 45	222. 0	95. 41	+ 9. 44	705
		3770	·8949	273. 11	212. 14	85. 55	+21. 24	707
		1	·9713	282. 11	223. 40	97. 21	+32. 48	706
		2	·9305	286. 43	213. 17	86. 58	+34. 41	706
		3	·6199	255. 31	190. 24	64. 5	+ 2. 32	708
		4	·4449	263. 51	177. 53	51. 34	+ 4. 19	708
		5	·4588	300. 22	169. 27	43. 8	+18. 18	709
		6	·3128	341. 58	151. 9	24. 50	+14. 47	709
		7	·1676	126. 55	147. 46	21. 27	−11. 35	710
		8	·2471	110. 32	142. 7	15. 48	−12. 58	710
		9	·6353	24. 43	122. 20	356. 1	+22. 27	711
		3780	·6615	42. 20	114. 43	348. 24	+13. 29	712
		1	·7599	29. 55	111. 2	344. 43	+24. 51	711
9	129·644	2	·9262	251. 13	222. 12	65. 16	+ 2. 6	708
		3	·8114	254. 40	208. 22	51. 26	+ 3. 50	708
		4	·7678	276. 5	200. 15	43. 19	+19. 13	709
		5	·7162	277. 35	195. 30	38. 34	+18. 32	709
		6	·4204	227. 42	178. 24	21. 28	−11. 2	710
		7	·3066	217. 0	170. 19	13. 23	−11. 55	710
		8	·4335	340. 15	153. 34	356. 38	+22. 29	711
		9	·3282	7. 32	145. 8	348. 12	+13. 26	712
		3790	·5258	3. 52	139. 59	343. 3	+25. 4	711
		1	·5619	87. 30	121. 58	325. 2	−13. 32	714
		2	·9763	78. 56	77. 10	280. 14	−11. 39	716
		3	·7976	48. 5	104. 20	307. 24	+13. 32	715
		4	·8312	43. 18	102. 8	305. 12	+18. 10	715

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
May 13	133·627	3795	·9699	237. 28	234. 28	21. 2	−11. 32	710
		6	·6744	219. 13	197. 30	344. 4	−21. 22	713
		7	·7091	271. 56	200. 39	347. 13	+14. 15	712
		8	·8339	278. 30	210. 6	356. 40	+22. 48	711
		9	·7054	290. 15	194. 18	340. 52	+25. 41	711
		3800	·4034	220. 21	179. 54	326. 28	−13. 27	714
		1	·3363	204. 57	173. 9	319. 43	−15. 56	714
		2	·3060	330. 54	161. 2	307. 36	+14. 57	715
		3	·3409	345. 21	156. 13	302. 47	+17. 5	715
		4	·4227	91. 11	135. 11	281. 45	−11. 40	716
		5	·8274	99. 30	106. 8	253. 42	−26. 37	717
15	135·665	6	·7672	233. 20	209. 44	327. 24	−13. 42	714
		7	·6721	227. 19	200. 52	318. 32	−16. 20	714
		8	·9304	264. 51	227. 29	345. 9	+13. 31	712
		9	·9828	273. 17	237. 36	355. 16	+23. 3	711
		3810	·9046	278. 58	220. 47	338. 27	+25. 24	711
		1	·5689	276. 36	191. 39	309. 19	+13. 2	715
		2	·4845	290. 23	182. 47	300. 27	+16. 17	715
		3	·1617	173. 33	162. 51	280. 31	−11. 22	716
		4	·5407	119. 12	137. 44	255. 24	−26. 34	717
		5	·4951	109. 29	136. 47	254. 27	−20. 46	717
		6	·9744	85. 55	83. 39	201. 19	−16. 45	718
20	140·450	7	·6478	215. 12	200. 5	249. 52	−23. 32	717
		8	·3366	124. 48	153. 13	203. 0	−17. 34	718
		9	·4347	115. 39	146. 9	195. 56	−19. 34	718
		3820	·5691	90. 26	131. 58	181. 45	−12. 36	719
		1	·6546	93. 20	126. 20	176. 7	−16. 0	719
		2	·7956	97. 29	115. 14	165. 1	−22. 9	721
		3	·7533	48. 20	119. 3	169. 50	+15. 19	720
		4	·8976	48. 2	103. 58	153. 45	+19. 18	722
21	141·458	5	·7949	223. 28	215. 40	251. 9	−22. 37	717
		6	·8066	218. 47	215. 35	251. 4	−26. 32	717
		7	·2721	168. 4	168. 4	203. 33	−17. 20	718
		8	·3229	144. 46	160. 35	196. 4	−19. 42	718
		9	·3654	102. 41	147. 34	183. 3	−12. 40	719
		3830	·4856	102. 15	140. 35	176. 4	−16. 6	719
		1	·6578	103. 12	129. 22	165. 51	−21. 50	721
		2	·9789	86. 6	88. 5	123. 34	−15. 7	724
		3	·5944	42. 9	133. 34	169. 3	+15. 9	720
		4	·7630	44. 44	120. 5	155. 34	+18. 28	722
		5	·8100	43. 57	115. 55	151. 24	+20. 27	722
		6	·9648	53. 3	92. 50	128. 19	+16. 47	723
22	142·454	7	·9113	225. 38	230. 47	252. 9	−23. 57	717
		8	·3754	201. 4	181. 36	202. 58	−18. 16	718
		9	·2140	141. 13	162. 43	184. 5	−13. 9	719
		3840	·2726	123. 11	157. 5	178. 27	−13. 55	719
		1	·5079	113. 30	143. 17	164. 39	−21. 20	721
		2	·4338	30. 34	147. 14	168. 36	+14. 51	720
		3	·6113	38. 43	134. 25	155. 47	+17. 48	722
		4	·6703	38. 38	130. 19	151. 41	+19. 51	722
		5	·9253	86. 55	99. 56	121. 18	−15. 1	724
		6	·8956	51. 43	105. 30	126. 52	+16. 41	723
		7	·9873	62. 59	86. 46	108. 8	+ 7. 58	725

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
May 23	143·561	3848	·9846	227. 1	247. 24	253. 4	−24. 32	717
		9	·5538	219. 45	197. 37	203. 17	−18. 16	718
		3850	·2465	191. 58	175. 24	181. 4	−13. 43	719
		1	·3209	147. 58	163. 28	169. 8	−19. 34	721
		2	·3880	137. 15	158. 9	163. 49	−22. 4	721
		3	·4302	126. 45	152. 44	158. 24	−22. 0	721
		4	·3006	358. 13	163. 1	168. 41	+15. 11	720
		5	·4339	23. 3	150. 39	156. 19	+17. 30	722
		6	·5103	25. 27	146. 5	151. 45	+20. 10	722
		7	·7374	88. 40	121. 47	127. 27	−13. 25	724
		8	·8006	88. 52	116. 4	121. 44	−14. 34	724
		9	·9779	82. 48	90. 21	96. 1	−11. 10	726
		3860	·7697	48. 36	120. 40	126. 20	+16. 31	723
		1	·9262	62. 30	100. 56	106. 36	+ 7. 55	725
24	144·576	2	·7139	227. 35	218. 1	209. 17	−18. 8	718
		3	·4076	220. 26	189. 52	181. 8	−13. 33	719
		4	·3638	209. 54	185. 13	176. 29	−15. 23	719
		5	·3299	188. 0	177. 46	169. 2	−18. 32	721
		6	·3584	170. 26	172. 16	163. 32	−22. 2	721
		7	·3771	154. 33	166. 0	157. 16	−23. 13	721
		8	·3239	316. 16	177. 24	168. 40	+15. 32	720
		9	·3286	352. 27	165. 29	156. 45	+17. 24	722
		3870	·6212	42. 7	134. 57	126. 13	+16. 51	723
		1	·5750	93. 24	135. 49	127. 5	−13. 12	724
		2	·6496	92. 41	130. 21	121. 37	−14. 16	724
		3	·8078	60. 46	116. 5	107. 21	+ 8. 14	725
		4	·9145	83. 25	103. 20	94. 36	−10. 57	726
		5	·8599	92. 39	111. 17	102. 33	−18. 20	726
27	147·504	6	·9065	239. 39	236. 13	185. 57	−12. 32	719
		7	·7991	237. 45	223. 50	173. 34	−12. 45	719
		8	·7038	225. 41	213. 14	162. 58	−19. 34	721
		9	·2921	323. 16	177. 40	127. 24	+14. 52	723
		3880	·2789	39. 54	158. 16	108. 0	+ 7. 44	725
		1	·4980	94. 10	143. 42	93. 26	−11. 12	726
		2	·5724	92. 24	138. 30	88. 14	−11. 45	726
		3	·8853	106. 49	113. 53	63. 37	−29. 58	728
		4	·7547	44. 0	127. 9	76. 53	+20. 42	727
		5	·8307	41. 52	120. 30	70. 14	+24. 45	727
30	150·382	6	·9871	235. 2	254. 48	163. 43	−18. 53	721
		7	·4424	273. 26	199. 22	108. 17	+ 7. 47	725
		8	·2763	211. 56	186. 34	95. 29	−11. 18	726
		9	·2058	187. 23	179. 19	88. 14	−11. 31	726
		3890	·5911	132. 27	153. 31	62. 26	−30. 44	728
		1	·3621	352. 20	171. 24	80. 19	+20. 13	727
		2	·3991	6. 34	165. 12	74. 7	+20. 52	727
		3	·8901	87. 55	112. 28	21. 23	−12. 36	730
June 5	156·358	4	·6758	279. 2	220. 18	44. 26	+15. 5	729
		5	·4968	221. 53	205. 23	30. 31	−16. 14	730
		6	·4263	206. 45	197. 8	21. 16	−18. 50	730
		7	·3442	217. 9	196. 2	20. 10	−12. 29	730
		8	·5041	325. 17	192. 3	16. 11	+27. 58	731
		9	·4984	342. 25	182. 30	6. 38	+29. 43	731
		3900	·7239	100. 7	136. 36	320. 44	−16. 53	734

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
June 5		3901	·9412	94. 37	111. 13	295. 21	−17. 7	736
		2	·6418	50. 17	143. 28	327. 36	+16. 21	733
		3	·6882	52. 5	139. 34	323. 42	+16. 25	733
6	157·546	4	·6866	232. 55	221. 58	29. 15	−15. 58	730
		5	·5520	232. 49	212. 22	19. 39	−12. 47	730
		6	·8035	276. 48	232. 57	40. 14	+15. 59	729
		7	·6339	303. 55	210. 26	17. 43	+27. 42	731
		8	·5593	319. 16	198. 39	5. 56	+29. 46	731
		9	·5360	111. 28	153. 56	321. 13	−17. 31	734
		3910	·4555	38. 11	159. 40	326. 57	+16. 37	733
		1	·8292	98. 22	127. 34	294. 51	−17. 34	736
8	159·528	2	·9470	241. 34	253. 26	32. 37	−15. 2	730
		3	·8982	237. 20	245. 20	24. 31	−17. 56	730
		4	·8474	242. 11	239. 55	19. 6	−12. 48	730
		5	·8631	290. 47	238. 14	17. 25	+28. 19	731
		6	·7674	297. 56	225. 36	4. 47	+29. 58	731
		7	·6613	295. 22	218. 5	357. 16	+24. 7	732
		8	·2868	335. 32	186. 50	326. 1	+16. 37	733
		9	·5196	114. 24	157. 27	296. 38	−17. 41	736
		3920	·6338	106. 46	147. 53	287. 4	−17. 34	736
		1	·4422	43. 13	161. 11	300. 22	+14. 47	735
10	161·687	2	·9537	289. 41	255. 8	3. 41	+29. 46	731
		3	·9186	285. 16	249. 36	358. 9	+24. 39	732
		4	·8851	288. 29	244. 4	352. 37	+26. 31	732
		5	·5815	286. 56	217. 25	325. 58	+16. 34	733
		6	·3279	179. 23	189. 0	297. 33	−18. 2	736
		7	·3272	306. 8	198. 25	306. 58	+14. 34	735
		8	·6590	96. 44	145. 47	254. 20	−11. 20	738
		9	·7154	97. 47	141. 34	250. 7	−13. 7	738
11	162·596	3930	·9505	286. 35	255. 59	351. 39	+26. 26	732
		1	·7174	281. 18	229. 43	325. 23	+16. 22	733
		2	·4946	288. 56	212. 21	308. 1	+14. 58	735
		3	·4184	207. 27	202. 2	297. 42	−18. 16	736
		4	·2833	8. 21	180. 33	276. 13	+16. 11	737
		5	·4782	105. 7	160. 19	255. 59	−11. 27	738
		6	·5898	103. 42	152. 52	248. 32	−13. 47	738
14	165·403	7	·8264	237. 7	241. 48	297. 39	−18. 7	736
		8	·9874	276. 38	269. 22	325. 13	+16. 30	733
		9	·8988	275. 53	251. 57	307. 48	+14. 38	735
		3940	·8495	279. 42	245. 28	301. 19	+17. 8	735
		1	·2813	213. 21	200. 5	255. 56	−10. 41	738
		2	·2821	188. 35	194. 6	249. 57	−14. 21	738
		3	·7171	127. 15	154. 24	210. 15	−30. 42	740
		4	·4461	121. 35	168. 33	224. 24	−16. 5	739
		5	·4949	116. 29	164. 26	220. 17	−16. 0	739
		6	·9169	99. 14	124. 7	179. 58	−16. 59	742
		7	·9254	63. 13	121. 57	177. 48	+16. 0	743
18	169·554	8	·6441	234. 51	229. 10	226. 8	−15. 42	739
		9	·5716	229. 10	222. 44	219. 42	−16. 34	739
		3950	·4337	210. 15	209. 8	206. 6	−18. 16	741
		1	·4315	196. 47	203. 57	200. 55	−21. 23	741
		2	·4120	161. 58	188. 22	185. 20	−22. 15	742
		3	·3233	23. 32	182. 33	179. 31	+17. 28	743

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
June 18		3954	·4126	43. 13	173. 13	170. 11	+16. 23	743
		5	·8550	101. 43	136. 11	133. 9	−15. 56	746
		6	·6859	54. 46	152. 36	149. 34	+19. 23	745
		7	·7636	58. 37	145. 12	142. 10	+18. 36	745
		8	·7562	53. 4	147. 8	144. 6	+22. 26	745
22	173·499	9	·9531	243. 40	266. 54	207. 54	−18. 19	741
		3960	·7992	243. 19	247. 6	188. 6	−14. 47	742
		1	·3699	245. 12	217. 1	158. 1	− 4. 47	744
		2	·4294	158. 26	189. 31	130. 31	−22. 20	746
		3	·4666	139. 51	180. 26	121. 26	−20. 45	746
		4	·3497	322. 12	207. 36	148. 36	+19. 17	745
		5	·4223	324. 58	209. 13	150. 13	+23. 38	745
		6	·2678	341. 28	199. 52	140. 52	+17. 9	745
		7	·7976	110. 48	147. 39	88. 39	−19. 56	749
		8	·8798	112. 32	139. 12	80. 12	−23. 59	749
		9	·8844	101. 52	136. 17	77. 17	−15. 0	749
		3970	·6525	67. 39	156. 48	97. 48	+11. 54	747
		1	·7496	42. 50	155. 20	96. 20	+30. 48	748
25	176·616	2	·6733	228. 20	234. 49	131. 37	−21. 43	746
		3	·5584	220. 35	224. 34	121. 22	−20. 46	746
		4	·4734	221. 58	220. 29	117. 17	−16. 33	746
		5	·4065	200. 42	210. 7	106. 55	−19. 3	746
		6	·9170	289. 31	264. 33	161. 21	+23. 17	745
		7	·8036	287. 55	251. 4	147. 52	+19. 38	745
		8	·8308	292. 15	253. 3	149. 51	+23. 41	745
		9	·7750	295. 25	246. 38	143. 26	+24. 38	745
		3980	·4433	128. 40	180. 4	76. 52	−15. 28	749
		1	·1698	333. 47	203. 2	99. 50	+11. 27	747
		2	·4783	355. 11	199. 22	96. 10	+30. 51	748
		3	·8100	123. 55	153. 34	50. 22	−28. 48	750
		4	·8616	120. 10	146. 31	43. 19	−28. 12	750
		5	·9853	107. 15	121. 17	18. 5	−21. 21	753
		6	·9817	98. 53	121. 34	18. 22	−13. 4	753
		7	·7739	72. 25	149. 18	46. 6	+11. 16	751
		8	·8572	71. 47	140. 56	37. 44	+12. 35	751
		9	·8489	56. 22	144. 8	40. 56	+25. 22	752
26	177·336	3990	·7694	234. 14	245. 4	131. 39	−21. 38	746
		1	·6561	229. 15	234. 29	121. 4	−20. 38	746
		2	·5919	233. 42	231. 35	118. 10	−15. 56	746
		3	·5022	217. 47	221. 4	107. 39	−19. 22	746
		4	·8872	286. 18	261. 32	148. 7	+19. 38	745
		5	·8494	293. 4	255. 44	142. 19	+24. 36	745
		6	·3464	147. 36	190. 32	77. 7	−15. 19	749
		7	·2806	300. 2	213. 42	100. 17	+11. 33	747
		8	·5023	339. 49	209. 10	95. 45	+31. 16	748
		9	·7272	130. 5	164. 10	50. 45	−28. 40	750
		4000	·7877	124. 25	156. 29	43. 4	−27. 52	750
		1	·9330	108. 40	134. 3	20. 38	−20. 37	753
		2	·9290	100. 13	133. 19	19. 54	−12. 46	753
		3	·6552	70. 5	160. 4	46. 39	+11. 49	751
		4	·7673	70. 47	150. 45	37. 20	+12. 44	751
		5	·7598	54. 16	154. 33	41. 8	+24. 47	752
		6	·8370	54. 38	146. 40	33. 15	+26. 46	752

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
July 1	182·576	4007	·9037	245. 31	266. 48	79. 3	−18. 32	749
		8	·8400	242. 18	258. 23	70. 38	−19. 19	749
		9	·8156	246. 20	256. 52	69. 7	−15. 25	749
		4010	·9651	300. 2	278. 47	91. 2	+31. 53	748
		1	·7459	222. 39	242. 8	54. 23	−29. 23	750
		2	·6535	217. 14	232. 55	45. 10	−27. 29	750
		3	·4740	287. 3	232. 10	44. 25	+11. 41	751
		4	·3871	300. 6	224. 47	37. 2	+14. 46	751
		5	·5680	304. 5	234. 36	46. 51	+22. 14	752
		6	·4785	318. 13	224. 34	36. 49	+24. 27	752
		7	·4593	329. 48	219. 0	31. 15	+26. 47	752
		8	·3740	203. 59	214. 59	27. 14	−16. 31	753
		9	·2660	184. 1	206. 48	19. 3	−12. 15	753
		4020	·3752	171. 37	202. 41	14. 56	−18. 45	753
		1	·4056	158. 54	197. 8	9. 23	−19. 27	753
		2	·4690	30. 2	188. 58	1. 13	+26. 12	754
		3	·5949	44. 52	176. 5	348. 20	+26. 29	754
		4	·4547	45. 13	184. 12	356. 27	+20. 41	754
		5	·5884	70. 41	170. 5	343. 20	+12. 25	755
		6	·6889	69. 56	162. 40	334. 55	+14. 24	755
		7	·9245	107. 28	139. 53	312. 8	−16. 52	758
		8	·9160	71. 14	139. 7	311. 22	+16. 21	757
3	184·563	9	·9228	234. 34	268. 15	52. 19	−29. 34	750
		4030	·8622	233. 34	259. 37	43. 41	−27. 42	750
		1	·5256	238. 11	234. 30	18. 34	−12. 31	753
		2	·5407	224. 44	231. 12	15. 16	−18. 58	753
		3	·4762	214. 58	224. 18	9. 22	−19. 22	753
		4	·7971	280. 52	259. 29	43. 33	+11. 40	751
		5	·7171	286. 13	251. 48	35. 52	+14. 47	751
		6	·8333	293. 19	261. 39	45. 43	+22. 11	752
		7	·7447	299. 36	251. 31	35. 35	+24. 47	752
		8	·6828	306. 21	244. 15	28. 19	+27. 12	752
		9	·4072	338. 59	215. 42	359. 46	+25. 40	754
		4040	·3107	345. 13	211. 24	355. 28	+20. 46	754
		1	·3501	354. 14	208. 40	352. 44	+23. 36	754
		2	·3986	6. 52	203. 21	347. 25	+26. 24	754
		3	·0950	325. 53	209. 57	354. 1	+ 7. 49	755
		4	·0869	26. 9	204. 40	348. 44	+ 7. 40	755
		5	·2108	42. 34	198. 26	342. 30	+11. 56	755
		6	·3291	54. 32	190. 46	334. 50	+13. 44	755
		7	·7104	116. 54	166. 14	310. 18	−17. 6	758
		8	·6772	68. 30	165. 47	309. 51	+15. 56	757
4	185·530	9	·9773	237. 49	281. 31	51. 52	−29. 34	750
		4050	·6846	246. 50	248. 11	18. 32	−12. 26	753
		1	·6765	236. 7	244. 36	14. 57	−18. 51	753
		2	·6007	230. 47	237. 39	8. 0	−18. 52	753
		3	·9043	280. 33	272. 32	42. 53	+11. 46	751
		4	·8434	285. 12	264. 51	35. 12	+15. 20	751
		5	·9258	292. 5	274. 57	45. 18	+22. 29	752
		6	·8576	296. 18	264. 55	35. 16	+24. 53	752
		7	·7964	301. 33	256. 57	27. 18	+27. 27	752
		8	·5071	319. 44	228. 48	359. 9	+26. 8	754
		9	·4042	317. 32	224. 30	354. 51	+20. 45	754

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
July 4		4060	·4181	327. 58	221. 33	351. 54	+24. 9	754
		1	·4204	341. 10	216. 12	346. 33	+26. 48	754
		2	·3027	284. 13	224. 58	355. 19	+ 7. 43	755
		3	·1804	292. 47	217. 27	347. 48	+ 7. 27	755
		4	·1712	332. 28	212. 23	342. 44	+12. 7	755
		5	·1977	18. 14	204. 5	334. 26	+14. 5	755
		6	·5789	126. 13	179. 5	309. 26	−17. 25	758
		7	·6339	120. 24	173. 40	304. 1	−16. 22	758
		8	·5145	62. 47	179. 20	309. 41	+16. 6	757
		9	·9678	113. 8	135. 25	265. 46	−22. 12	760
6	187·723	4070	·9286	248. 11	275. 14	14. 29	−18. 47	753
		1	·9430	255. 46	278. 56	18. 11	−12. 13	753
		2	·6076	237. 4	241. 53	341. 8	−16. 14	756
		3	·9714	298. 23	286. 2	25. 17	+28. 17	752
		4	·7460	276. 9	258. 8	357. 23	+ 6. 53	755
		5	·6784	277. 59	252. 32	351. 47	+ 7. 58	755
		6	·5710	287. 22	243. 49	343. 4	+12. 43	755
		7	·4573	294. 8	235. 22	334. 37	+13. 56	755
		8	·7912	301. 45	258. 49	358. 4	+26. 51	754
		9	·7368	296. 59	254. 55	354. 10	+21. 57	754
		4080	·7178	301. 37	252. 8	351. 23	+24. 39	754
		1	·6635	308. 56	245. 27	344. 42	+27. 26	754
		2	·3557	179. 46	209. 51	309. 6	−17. 9	758
		3	·2225	359. 53	210. 2	309. 17	+16. 23	757
		4	·7712	123. 6	165. 49	265. 4	−22. 12	760
		5	·8860	72. 9	148. 5	247. 20	+17. 33	761
8	189·580	6	·5252	228. 27	235. 34	308. 29	−17. 14	758
		7	·8515	283. 28	269. 56	342. 51	+12. 37	755
		8	·9158	296. 33	277. 5	350. 0	+24. 53	754
		9	·8666	300. 48	269. 30	342. 25	+27. 33	754
		4090	·4582	300. 21	236. 13	309. 8	+16. 24	757
		1	·4170	296. 23	234. 27	307. 22	+13. 46	757
		2	·5360	145. 34	192. 14	265. 9	−22. 15	760
		3	·6640	139. 42	182. 33	255. 28	−26. 33	760
		4	·6163	66. 40	175. 45	248. 40	+17. 43	761
		5	·6763	67. 45	171. 1	243. 56	+18. 17	761
		6	·6459	73. 24	172. 29	245. 24	+14. 8	761
9	190·539	7	·6640	239. 38	248. 45	308. 3	−17. 15	758
		8	·9381	283. 32	282. 29	341. 47	+12. 44	755
		9	·9710	296. 26	288. 54	348. 12	+25. 14	754
		4100	·9396	299. 56	281. 43	341. 1	+28. 5	754
		1	·6156	293. 31	248. 59	308. 17	+16. 30	757
		2	·4623	166. 13	205. 9	264. 27	−22. 32	760
		3	·4614	58. 57	188. 36	247. 54	+17. 49	761
		4	·5266	62. 8	183. 50	243. 8	+18. 16	761
		5	·9869	72. 29	131. 24	190. 42	+19. 16	762
11	192·633	6	·9198	251. 12	278. 35	308. 11	−17. 34	758
		7	·5425	217. 13	234. 11	263. 47	−22. 28	760
		8	·9296	287. 31	283. 3	312. 39	+15. 36	757
		9	·8760	288. 29	275. 33	305. 9	+16. 6	757
		4110	·4798	300. 37	240. 43	270. 19	+16. 46	759
		1	·1899	340. 20	218. 50	248. 26	+14. 11	761
		2	·2446	346. 33	218. 38	248. 14	+17. 38	761

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
July 11		4113	·2713	3. 40	214. 16	243. 52	+19. 45	761
		4	·8723	105. 48	155. 30	185. 6	− 9. 37	763
		5	·8313	72. 2	159. 16	188. 52	+19. 5	762
12	193·714	6	·6762	232. 20	249. 22	263. 38	−22. 29	760
		7	·3895	310. 57	234. 22	248. 38	+17. 50	761
		8	·6772	68. 47	174. 56	189. 12	+19. 9	762
13	194·482	9	·7673	238. 38	259. 28	262. 50	−22. 37	760
		4120	·5224	301. 34	245. 11	249. 33	+18. 5	761
		1	·7350	107. 35	170. 42	174. 4	− 7. 33	764
		2	·7933	107. 20	165. 33	168. 55	− 8. 29	764
		3	·5581	64. 58	185. 13	188. 35	+18. 53	762
17	198·551	4	·3051	236. 27	234. 7	179. 47	− 6. 24	764
		5	·2475	199. 1	223. 45	169. 25	− 9. 11	764
		6	·4282	312. 22	241. 19	186. 59	+19. 21	762
		7	·4690	318. 8	242. 0	187. 40	+22. 58	762
		8	·5780	130. 32	191. 11	136. 51	−15. 31	767
		9	·8157	120. 54	170. 1	115. 41	−17. 55	769
		4130	·8298	77. 18	164. 38	110. 18	+17. 13	770
18	199·572	1	·6013	301. 49	255. 55	187. 6	+19. 22	762
		2	·4490	251. 58	245. 36	176. 47	− 5. 56	764
		3	·3756	235. 53	238. 15	169. 26	− 9. 15	764
		4	·4134	150. 26	207. 6	138. 17	−15. 7	767
		5	·6762	128. 43	184. 57	116. 8	−17. 55	769
		6	·5408	85. 5	188. 45	119. 56	+ 9. 33	768
		7	·6808	75. 0	179. 30	110. 41	+17. 15	770
		8	·9563	116. 31	151. 15	82. 26	−18. 33	773
	199·715	9	·6267	301. 17	258. 2	187. 11	+19. 37	762
		4140	·6485	306. 7	258. 34	187. 43	+23. 3	762
		1	·4726	251. 58	247. 8	176. 17	− 6. 33	764
		2	·3977	239. 41	240. 22	169. 31	− 8. 54	764
		3	·3955	153. 40	208. 59	138. 8	−14. 55	767
		4	·6579	129. 53	186. 45	115. 54	−17. 51	769
		5	·5137	84. 27	190. 45	119. 54	+ 9. 43	768
		6	·6640	74. 33	181. 2	110. 11	+17. 19	770
		7	·9528	116. 44	152. 6	81. 15	−18. 33	773
19	200·528	8	·7401	298. 1	268. 38	186. 15	+19. 32	762
		9	·7666	301. 42	270. 23	188. 0	+22. 44	762
		4150	·6347	259. 1	259. 44	177. 21	− 6. 44	764
		1	·5382	251. 5	251. 41	169. 18	− 8. 47	764
		2	·3223	221. 59	233. 15	150. 52	−10. 17	765
		3	·2906	213. 9	229. 55	147. 32	−10. 7	765
		4	·3393	177. 38	219. 19	136. 56	−14. 43	767
		5	·3528	164. 24	214. 33	132. 10	−14. 18	767
		6	·5481	139. 28	197. 39	115. 16	−17. 45	769
		7	·8872	120. 3	163. 37	81. 14	−18. 49	773
		8	·9564	119. 43	152. 45	70. 22	−21. 8	773
		9	·9522	117. 19	153. 4	70. 41	−18. 43	773
		4160	·5287	70. 47	192. 13	109. 50	+17. 5	770
20	201·563	1	·8672	296. 30	282. 53	185. 49	+19. 56	762
		2	·8861	299. 22	284. 59	187. 55	+22. 40	762
		3	·5032	245. 13	249. 3	151. 59	−10. 35	765
		4	·4442	241. 28	244. 48	147. 44	−10. 4	765
		5	·4264	161. 0	212. 10	115. 6	−17. 46	769

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
July 20		4166	·3457	57. 59	206. 45	109. 41	+17. 2	770
		7	·8126	130. 57	176. 13	79. 9	−24. 9	773
		8	·7752	125. 26	177. 41	80. 37	−18. 42	773
		9	·8834	123. 33	165. 58	68. 54	−21. 13	773
		4170	·8612	121. 6	167. 53	70. 49	−18. 23	773
		1	·9915	85. 59	140. 5	43. 1	+10. 51	775
		2	·9913	73. 12	139. 34	42. 30	+23. 29	776
22	203·490	3	·9935	296. 45	309. 37	185. 13	+20. 3	762
		4	·7769	243. 25	268. 58	144. 34	−21. 51	766
		5	·6590	248. 33	261. 31	137. 7	−14. 14	767
		6	·4556	218. 53	239. 31	115. 7	−17. 47	769
		7	·6322	186. 25	224. 28	100. 4	−33. 58	771
		8	·3385	173. 46	220. 24	96. 0	−14. 5	772
		9	·4314	287. 55	250. 18	125. 54	+ 9. 13	768
		4180	·2537	332. 9	233. 42	109. 18	+16. 58	770
		1	·5051	151. 25	206. 52	82. 28	−19. 18	773
		2	·5764	143. 53	200. 13	75. 49	−20. 8	773
		3	·6652	137. 53	192. 22	67. 58	−21. 24	773
		4	·9348	116. 5	158. 32	34. 8	−15. 42	777
		5	·8391	87. 35	167. 50	43. 26	+10. 45	775
		6	·8805	72. 53	163. 59	39. 35	+23. 40	776
24	205·629	7	·9556	253. 33	296. 1	141. 17	−21. 29	766
		8	·7482	222. 15	257. 17	102. 33	−33. 35	771
		9	·7434	248. 12	269. 31	114. 47	−17. 47	769
		4190	·5176	240. 9	251. 48	97. 4	−13. 42	772
		1	·4571	208. 11	236. 39	81. 55	−20. 7	773
		2	·4240	189. 16	227. 35	72. 51	−19. 43	773
		3	·4510	175. 55	221. 15	66. 31	−20. 49	773
		4	·8012	286. 2	280. 24	125. 40	+ 9. 33	768
		5	·6175	298. 53	263. 58	109. 14	+16. 53	770
		6	·6991	127. 1	187. 45	33. 1	−15. 42	777
		7	·8096	123. 21	177. 21	22. 37	−16. 51	777
		8	·8290	115. 59	173. 36	18. 52	−11. 41	777
		9	·4962	85. 2	197. 40	42. 56	+10. 58	775
		4200	·6140	64. 28	193. 4	38. 20	+24. 9	776
		1	·9183	94. 29	160. 18	5. 34	+ 5. 9	778
		2	·9851	72. 34	145. 48	351. 4	+25. 57	779
25	206·641	3	·9732	252. 6	300. 35	131. 30	−24. 5	766
		4	·8639	254. 10	283. 36	114. 31	−17. 48	769
		5	·8415	232. 25	272. 18	103. 13	−33. 26	771
		6	·5639	229. 5	250. 58	81. 53	−20. 20	773
		7	·4866	216. 3	241. 51	72. 46	−20. 16	773
		8	·4555	204. 5	235. 30	66. 25	−20. 37	773
		9	·9179	287. 0	294. 55	125. 50	+ 9. 58	768
		4210	·7733	295. 52	278. 13	109. 8	+16. 48	770
		1	·5460	138. 25	202. 21	33. 16	−15. 39	777
		2	·6727	131. 57	192. 8	23. 3	−17. 25	777
		3	·6889	121. 21	187. 49	18. 44	−11. 27	777
		4	·2901	77. 51	212. 1	42. 56	+10. 58	775
		5	·4651	53. 17	207. 1	37. 56	+24. 11	776
		6	·7870	95. 43	176. 4	6. 59	+ 5. 27	778
		7	·9314	72. 29	159. 27	350. 22	+26. 5	779
30	211·545	8	·9768	288. 40	310. 48	72. 9	+ 9. 13	774

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
July 30		4219	·9649	257. 4	303. 46	65. 7	−20. 45	773
		4220	·6992	252. 22	272. 11	33. 32	−14. 47	777
		1	·5978	240. 26	261. 16	22. 37	−17. 32	777
		2	·4279	165. 42	221. 56	343. 17	−17. 9	780
		3	·7506	290. 30	281. 25	42. 46	+11. 18	775
		4	·6452	305. 54	271. 1	32. 22	+20. 33	776
		5	·6974	309. 23	274. 27	35. 48	+23. 57	776
		6	·2667	282. 5	248. 11	9. 32	+ 5. 56	778
		7	·1426	284. 47	240. 53	2. 14	+ 6. 16	778
		8	·3648	27. 1	226. 5	347. 26	+26. 3	779
		9	·4048	37. 24	220. 54	342. 15	+26. 39	779
		4230	·4740	79. 58	205. 30	326. 51	+14. 36	781
		1	·6499	84. 42	192. 37	313. 58	+14. 32	781
		2	·7291	92. 29	185. 47	307. 8	+ 9. 43	781
		3	·6404	123. 51	196. 11	317. 32	−10. 6	782
Aug. 1	213·664	4	·9406	263. 41	302. 14	33. 31	−14. 21	777
		5	·8685	257. 51	290. 57	22. 14	−17. 0	777
		6	·9697	291. 41	311. 11	42. 28	+11. 28	775
		7	·9050	301. 28	299. 44	31. 1	+20. 42	776
		8	·9253	306. 6	302. 34	33. 51	+25. 6	776
		9	·6930	283. 54	278. 40	9. 57	+ 6. 1	778
		4240	·5967	284. 58	271. 26	2. 43	+ 6. 53	778
		1	·4798	329. 21	255. 37	346. 54	+26. 18	779
		2	·4372	337. 51	250. 22	341. 39	+26. 57	779
		3	·1590	5. 18	235. 43	327. 0	+14. 55	781
		4	·1658	55. 10	228. 0	319. 17	+12. 39	781
		5	·2693	67. 22	221. 28	312. 45	+14. 19	781
		6	·3213	87. 1	216. 23	307. 40	+10. 6	781
		7	·9795	128. 6	160. 41	251. 58	−24. 41	785
4	216·537	8	·8478	310. 5	294. 21	344. 53	+26. 32	779
		9	·6303	298. 44	276. 5	326. 37	+14. 55	781
		4250	·4496	297. 3	263. 47	314. 19	+11. 55	781
		1	·3405	294. 56	257. 7	307. 39	+ 9. 55	781
		2	·6423	153. 49	211. 26	261. 58	−24. 36	783
		3	·7478	145. 57	200. 28	251. 0	−26. 7	785
		4	·6766	142. 14	203. 54	254. 26	−20. 34	783
		5	·7939	135. 45	192. 8	242. 40	−21. 36	785
		6	·9202	131. 5	176. 6	226. 38	−23. 21	786
		7	·5336	119. 36	206. 54	257. 26	− 3. 50	784
5	217·563	8	·9367	308. 12	308. 22	344. 21	+25. 52	779
		9	·7902	297. 12	290. 43	326. 42	+15. 5	781
		4260	·5563	291. 3	272. 17	308. 16	+ 9. 38	781
		1	·5076	164. 36	223. 41	259. 40	−20. 33	783
		2	·6365	158. 18	214. 55	250. 54	−25. 55	785
		3	·6775	147. 57	207. 12	243. 11	−23. 24	785
		4	·8264	136. 56	190. 22	226. 21	−23. 32	786
		5	·8867	136. 9	183. 21	219. 20	−25. 42	786
7	219·630	6	·8822	264. 9	299. 13	305. 53	−13. 53	782
		7	·9774	298. 17	319. 14	325. 54	+15. 38	781
		8	·8744	291. 43	301. 47	308. 27	+10. 7	781
		9	·5212	229. 47	259. 22	266. 2	−18. 53	783
		4270	·4886	217. 58	252. 49	259. 29	−20. 13	783
		1	·5340	197. 59	243. 3	249. 43	−25. 48	785

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Aug. 7		4272	·5071	178. 36	232. 18	238. 58	−23. 1	785
		3	·5661	161. 46	221. 39	228. 19	−22. 44	786
		4	·6828	152. 47	210. 54	217. 34	−25. 36	786
		5	·5392	99. 10	207. 46	214. 26	+ 7. 39	787
		6	·6065	101. 14	203. 3	209. 43	+ 6. 24	787
		7	·6725	80. 29	199. 28	206. 8	+20. 1	788
		8	·8911	85. 11	177. 9	183. 49	+19. 13	789
		9	·9686	132. 48	170. 11	176. 51	−26. 13	790
9	221·549	4280	·7381	250. 22	282. 40	262. 7	−19. 28	783
		1	·6264	232. 46	267. 22	246. 49	−23. 32	785
		2	·5825	220. 35	258. 49	238. 16	−25. 17	785
		3	·4957	205. 20	248. 11	227. 38	−22. 40	786
		4	·5335	185. 10	236. 58	216. 25	−25. 19	786
		5	·4664	257. 7	266. 53	246. 20	− 6. 29	784
		6	·8292	142. 26	195. 43	175. 10	−26. 27	790
		7	·1262	92. 20	235. 11	214. 38	+ 7. 48	787
		8	·3189	60. 18	228. 21	207. 48	+18. 55	788
		9	·4249	66. 23	221. 22	200. 49	+21. 1	788
		4290	·6359	81. 10	204. 9	183. 36	+19. 27	789
		1	·8588	88. 0	182. 54	162. 21	+17. 14	792
		2	·9285	91. 38	173. 30	152. 57	+14. 6	792
10	222·592	3	·8643	257. 5	297. 42	262. 21	−19. 52	783
		4	·7892	254. 40	289. 23	254. 2	−18. 47	783
		5	·7483	244. 52	282. 2	246. 41	−23. 34	785
		6	·6627	238. 19	273. 1	237. 40	−23. 0	785
		7	·5718	226. 54	262. 34	227. 13	−22. 46	786
		8	·5446	207. 45	251. 9	215. 48	−25. 33	786
		9	·7224	151. 46	210. 7	174. 46	−26. 33	790
		4300	·1118	297. 45	249. 36	214. 15	+ 7. 49	787
		1	·2177	17. 4	242. 46	207. 25	+18. 55	788
		2	·4669	74. 11	218. 9	182. 48	+19. 27	789
		3	·7173	87. 25	197. 49	162. 28	+16. 46	792
		4	·8193	91. 50	188. 4	152. 43	+14. 9	792
		5	·8921	87. 51	179. 46	144. 25	+17. 51	792
11	223·522	6	·9413	261. 38	310. 21	261. 49	−19. 24	783
		7	·8809	259. 44	301. 13	252. 41	−18. 38	785
		8	·8490	252. 19	295. 5	246. 33	−23. 16	785
		9	·7715	248. 0	286. 0	237. 28	−22. 51	785
		4310	·6693	240. 16	275. 4	226. 32	−22. 31	786
		1	·6098	224. 37	263. 41	215. 9	−25. 50	786
		2	·6303	163. 52	222. 56	174. 24	−26. 31	790
		3	·3150	290. 21	262. 35	214. 3	+ 7. 48	787
		4	·2885	333. 29	255. 49	207. 17	+18. 45	788
		5	·3094	57. 16	231. 32	183. 0	+19. 29	789
		6	·5558	83. 37	211. 34	163. 2	+17. 8	792
		7	·6793	91. 18	201. 32	153. 0	+14. 2	792
		8	·7623	87. 40	194. 45	146. 13	+17. 21	792
		9	·8999	134. 48	186. 14	137. 42	−23. 11	793
14	226·485	4320	·9532	260. 4	314. 41	224. 7	−22. 17	786
		1	·8416	291. 9	304. 39	214. 5	+ 7. 51	787
		2	·7646	305. 19	296. 37	206. 3	+18. 55	788
		3	·4721	314. 55	272. 55	182. 21	+19. 5	789
		4	·2112	344. 18	253. 43	163. 9	+16. 52	792

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Aug. 14		4325	·2442	23. 46	245. 5	154. 31	+20. 33	792
		6	·1494	46. 27	242. 38	152. 4	+13. 58	792
		7	·2522	56. 17	237. 17	146. 43	+17. 34	792
		8	·3493	205. 5	250. 18	159. 44	−13. 29	791
		9	·5797	163. 59	227. 36	137. 2	−23. 6	793
17	229·492	4330	·5862	228. 49	269. 34	136. 21	−23. 27	793
		1	·9022	304. 58	314. 59	181. 46	+19. 1	789
		2	·7203	303. 28	295. 54	162. 41	+16. 27	792
		3	·6217	312. 32	286. 46	153. 33	+20. 54	792
		4	·5674	302. 36	284. 11	150. 58	+14. 19	792
		5	·4602	319. 3	274. 28	141. 15	+20. 12	792
		6	·6998	144. 4	213. 47	80. 34	−19. 26	794
		7	·8459	135. 30	198. 0	64. 47	−19. 38	796
		8	·7256	93. 7	203. 27	70. 14	+14. 43	795
		9	·7926	72. 10	200. 34	67. 21	+31. 23	797
		4340	·9768	83. 36	170. 50	37. 37	+24. 18	799
20	232·484	1	·9530	301. 14	326. 7	150. 27	+14. 38	792
		2	·4871	172. 56	240. 17	64. 37	−19. 23	796
		3	·5433	151. 52	228. 58	53. 18	−15. 47	798
		4	·5141	77. 13	224. 44	49. 4	+21. 16	799
		5	·4638	41. 51	240. 13	64. 33	+31. 42	797
		6	·6702	78. 38	213. 9	37. 29	+24. 28	799
21	233·518	7	·4434	201. 2	255. 9	64. 49	−19. 17	796
		8	·4337	174. 18	243. 19	52. 59	−16. 28	798
		9	·4157	17. 51	254. 8	63. 48	+31. 20	797
		4350	·3351	61. 25	239. 47	49. 27	+20. 48	799
		1	·5108	70. 21	227. 46	37. 26	+24. 28	799
		2	·9872	81. 17	170. 57	340. 37	+27. 44	803
26	238·510	3	·8632	246. 55	306. 20	45. 12	−31. 19	800
		4	·8335	243. 57	301. 35	40. 27	−31. 37	800
		5	·8568	265. 40	313. 10	52. 2	−16. 28	798
		6	·2943	237. 45	269. 11	8. 3	− 6. 27	801
		7	·7635	306. 38	308. 30	47. 22	+17. 20	799
		8	·8922	321. 20	321. 15	60. 7	+31. 11	797
		9	·6639	319. 39	297. 56	36. 48	+24. 44	799
		4360	·4055	357. 42	268. 45	7. 37	+28. 54	802
		1	·3445	12. 28	261. 34	0. 26	+26. 55	802
		2	·4324	49. 56	244. 29	343. 21	+28. 42	803
		3	·5089	63. 49	235. 16	334. 8	+27. 52	803
		4	·6465	96. 7	218. 32	317. 24	+14. 11	804
27	239·515	5	·9356	253. 38	320. 22	44. 58	−30. 28	800
		6	·9077	251. 8	314. 53	39. 29	−30. 53	800
		7	·5007	266. 1	286. 57	11. 33	− 5. 29	801
		8	·8983	305. 55	324. 19	48. 55	+17. 17	799
		9	·8037	315. 49	312. 23	36. 59	+24. 45	799
		4370	·9640	320. 39	335. 38	60. 14	+31. 15	797
		1	·5254	337. 54	283. 30	8. 6	+29. 18	802
		2	·4487	344. 48	276. 45	1. 21	+28. 9	802
		3	·3756	22. 11	258. 50	343. 26	+29. 0	803
		4	·3992	45. 7	248. 44	333. 20	+28. 3	803
		5	·9942	129. 48	178. 58	263. 34	−18. 35	807
28	240·565	6	·9656	255. 51	328. 13	37. 56	−30. 40	800
		7	·9797	306. 7	340. 29	50. 12	+16. 46	799

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Aug. 28		4378	·9150	314. 9	327. 30	37. 13	+24. 33	799
		9	·6158	327. 3	294. 26	4. 9	+27. 26	802
		4380	·4481	346. 46	277. 6	347. 49	+28. 37	803
		1	·3615	14. 50	263. 1	332. 44	+28. 4	803
		2	·9715	96. 49	183. 23	253. 6	+14. 49	808
		3	·9482	132. 56	193. 21	263. 4	−18. 42	807
29	241·569	4	·7297	322. 37	305. 58	1. 26	+27. 50	802
		5	·5880	331. 2	292. 14	347. 42	+28. 28	803
		6	·4232	348. 18	276. 29	331. 57	+27. 44	803
		7	·8630	137. 21	207. 25	262. 53	−18. 43	807
		8	·9772	132. 38	187. 46	243. 14	−19. 37	809
		9	·9828	138. 13	187. 22	242. 50	−25. 19	809
		4390	.8926	97. 36	197. 53	253. 21	+14. 50	808
		1	·9902	94. 57	178. 19	233. 47	−16. 29	810
30	242·667	2	·7500	322. 42	308. 58	348. 52	+28. 12	803
		3	·5610	331. 8	291. 33	331. 27	+27. 25	803
		4	·7318	144. 43	223. 2	262. 56	−18. 32	807
		5	·9203	141. 3	202. 16	242. 10	−24. 6	809
		6	·9044	136. 28	203. 4	242. 58	−19. 25	809
		7	·5577	95. 40	229. 13	269. 7	+14. 22	805
		8	·7563	97. 11	213. 29	253. 23	+15. 1	808
		9	·9358	96. 8	192. 33	232. 27	+16. 20	810
31	243·529	4400	·6844	323. 53	303. 48	331. 28	+27. 10	803
		1	·6165	154. 2	235. 18	262. 58	−18. 28	807
		2	·8472	145. 38	213. 53	241. 33	−24. 6	809
		3	·8211	141. 11	214. 49	242. 29	−19. 36	809
		4	·9631	137. 8	194. 8	221. 48	−22. 35	813
		5	·6120	95. 54	226. 8	253. 48	+14. 56	808
		6	·8513	96. 16	204. 49	232. 29	+16. 23	810
		7	·9347	117. 54	195. 24	223. 4	− 3. 40	812
Sept. 1	244·564	8	·8116	320. 28	317. 37	330. 37	+27. 34	803
		9	·4930	171. 32	249. 42	262. 42	−18. 19	807
		4410	·6226	169. 32	243. 25	256. 25	−25. 10	807
		1	·7353	153. 9	228. 1	241. 1	−23. 33	809
		2	·6973	149. 15	229. 2	242. 2	−19. 29	809
		3	·8907	141. 3	208. 3	221. 3	−22. 17	813
		4	·4153	90. 24	241. 5	254. 5	+15. 5	808
		5	·7079	94. 25	219. 46	232. 46	+17. 2	810
		6	·8250	120. 25	210. 9	223. 9	− 3. 16	812
2	245·446	7	·8991	318. 29	329. 40	330. 9	+27. 11	803
		8	·4368	193. 53	261. 58	262. 27	−18. 24	807
		9	·6392	163. 20	239. 59	240. 28	−23. 35	809
		4420	·5920	160. 26	241. 6	241. 35	−19. 52	809
		1	·8070	146. 18	219. 48	220. 17	−22. 21	813
		2	·6902	136. 9	225. 52	226. 21	−11. 7	811
		3	·6972	124. 3	222. 41	223. 10	− 3. 22	812
		4	·2394	76. 10	253. 55	254. 24	+14. 57	808
		5	·5664	92. 44	231. 41	232. 10	+16. 30	810
		6	·6590	90. 27	225. 5	225. 34	+19. 14	810
3	246·504	7	·9708	318. 23	344. 17	329. 46	+27. 21	803
		8	·4633	223. 23	276. 48	262. 17	−18. 24	807
		9	·5488	180. 52	254. 10	239. 39	−23. 42	809
		4430	·4884	180. 22	255. 36	241. 5	−19. 53	809

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Sept. 3		4431	·6901	155. 15	233. 50	219. 19	−22. 13	813
		2	·5008	148. 17	242. 25	227. 54	−10. 42	811
		3	·9806	98. 37	186. 43	172. 12	+14. 22	814
		4	·1410	4. 8	269. 5	254. 34	+14. 50	808
		5	·4084	82. 31	244. 38	230. 7	+18. 10	810
		6	·4940	84. 52	238. 52	224. 21	+19. 17	810
4	247·525	7	·5663	244. 11	290. 59	261. 59	−18. 14	807
		8	·5159	202. 18	267. 37	238. 37	−23. 46	809
		9	·4588	206. 36	269. 42	240. 42	−19. 57	809
		4440	·5704	169. 18	248. 9	219. 9	−21. 47	813
		1	·3492	173. 20	257. 43	228. 43	−10. 41	811
		2	·2393	59. 23	258. 49	229. 49	+18. 1	810
		3	·3316	69. 45	252. 31	223. 31	+19. 47	810
		4	·9108	99. 36	201. 11	172. 11	+14. 21	814
5	248·481	5	·6908	256. 7	304. 15	261. 41	−18. 16	807
		6	·7065	273. 4	310. 39	268. 5	− 8. 11	806
		7	·5491	222. 53	280. 34	238. 0	−23. 49	809
		8	.5136	229. 38	282. 56	240. 22	−20. 7	809
		9	·4904	190. 6	262. 5	219. 31	−21. 24	813
		4450	·3150	212. 37	271. 44	229. 10	−10. 50	811
		1	·4100	315. 9	291. 29	248. 55	+15. 42	808
		2	·1996	3. 54	272. 16	229. 42	+18. 1	810
		3	·2240	32. 12	266. 9	223. 35	+19. 51	810
		4	·7972	99. 48	215. 16	172. 42	+14. 18	814
		5	·9651	98. 30	192. 35	150. 1	+15. 12	815
7	250·557	6	·9230	269. 20	333. 27	261. 26	−18. 24	807
		7	·7725	250. 29	309. 44	237. 43	−25. 47	809
		8	·7541	257. 49	311. 31	239. 30	−20. 13	809
		9	·6401	243. 17	297. 9	225. 8	−22. 40	813
		4460	·5961	233. 30	289. 52	217. 51	−23. 59	813
		1	·5786	263. 9	301. 7	229. 6	−10. 26	811
		2	·9155	281. 59	335. 12	263. 11	− 6. 52	806
		3	·5310	316. 34	301. 12	229. 11	+18. 30	810
		4	·4760	324. 42	296. 3	224. 2	+21. 0	810
		5	·4495	94. 49	244. 26	172. 25	+14. 24	814
		6	·7565	99. 18	221. 9	149. 8	+14. 53	815
		7	·9223	92. 59	202. 25	130. 24	+21. 1	816
11	254·421	8	·9636	264. 23	342. 57	216. 8	−25. 37	813
		9	·4470	314. 22	299. 53	173. 4	+15. 32	814
		4470	·1380	12. 53	275. 49	149. 0	+14. 54	815
		1	·3475	61. 25	260. 59	134. 10	+22. 49	816
		2	.8225	103. 49	218. 32	91. 43	+12. 5	818
12	255·422	3	·6325	308. 45	314. 20	173. 19	+14. 56	814
		4	·2699	324. 18	289. 8	148. 7	+14. 47	815
		5	·2738	26. 17	274. 32	133. 31	+22. 56	816
		6	·3097	101. 58	257. 24	116. 23	+10. 25	817
		7	·6950	103. 11	231. 4	90. 3	+12. 29	818
13	256·459	8	·7947	307. 30	329. 13	173. 29	+15. 2	814
		9	·4710	312. 32	303. 42	147. 58	+14. 56	815
		4480	·3417	347. 14	289. 3	133. 19	+22. 47	816
		1	·0894	68. 0	272. 41	116. 57	+10. 47	817
		2	·4905	100. 48	247. 7	91. 23	+12. 38	818
14	257·438	3	·9100	307. 21	343. 29	173. 52	+14. 56	814

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Sept. 14		4484	·6539	308. 19	318. 1	148. 24	+14. 36	815
		5	·4925	328. 47	303. 11	133. 34	+22. 37	816
		6	·4034	339. 12	295. 15	125. 38	+23. 18	816
		7	·1890	314. 49	287. 35	117. 58	+10. 48	817
		8	·1034	319. 20	282. 41	113. 4	+ 9. 35	817
		9	·2720	92. 46	262. 17	92. 40	+12. 32	818
		4490	·9466	109. 38	205. 44	36. 7	+ 6. 34	822
		1	·9771	150. 55	207. 28	37. 51	−33. 34	823
15	258·492	2	·9784	308. 34	357. 34	173. 0	+15. 21	814
		3	·8084	308. 2	332. 34	148. 0	+15. 14	815
		4	·6551	321. 15	317. 26	132. 52	+22. 45	816
		5	·5596	326. 7	309. 20	124. 46	+23. 12	816
		6	·0972	30. 16	277. 42	93. 8	+12. 37	818
		7	·8319	111. 33	221. 49	37. 15	+ 6. 15	822
		8	·7957	100. 5	225. 19	40. 45	+15. 36	821
		9	·5455	161. 8	255. 26	70. 52	−16. 50	820
		4500	·9300	154. 59	220. 29	35. 55	−33. 39	823
		1	·9562	149. 33	213. 14	28. 40	−30. 39	823
21	264·452	2	·9447	254. 29	344. 42	75. 36	−34. 48	819
		3	·5534	235. 9	301. 25	32. 19	−21. 55	824
		4	·4922	292. 58	313. 37	44. 31	+ 4. 58	822
		5	·3776	294. 12	306. 23	37. 17	+ 6. 4	822
		6	·4083	316. 37	307. 14	38. 8	+14. 57	821
		7	·3747	2. 54	293. 19	24. 13	+27. 4	825
		8	·5651	149. 12	255. 38	346. 32	−12. 16	827
		9	·8428	145. 38	233. 16	324. 10	−20. 55	829
		4510	·7879	131. 37	234. 33	325. 27	− 8. 22	830
		1	·7616	86. 14	236. 19	327. 13	+26. 21	828
24	267·446	2	·7677	326. 20	335. 6	23. 32	+27. 45	825
		3	·2863	299. 32	303. 48	352. 14	+ 7. 42	826
		4	·2334	299. 33	300. 38	349. 4	+ 7. 35	826
		5	·3678	236. 9	298. 6	346. 32	−11. 39	827
		6	·3162	170. 20	276. 33	324. 59	− 8. 10	830
		7	·5191	181. 48	274. 10	322. 36	−21. 34	829
		8	·3850	47. 47	277. 42	326. 8	+27. 33	828
		9	·4569	59. 30	270. 17	318. 43	+28. 45	828
30	273·443	4520	·8519	280. 6	349. 4	312. 26	− 9. 54	830
		1	·9513	285. 16	3. 31	326. 53	− 8. 7	830
		2	·9180	322. 2	359. 55	323. 17	+26. 22	828
		3	·2803	193. 47	289. 36	252. 58	− 9. 14	832
		4	·4944	154. 28	269. 50	233. 12	−11. 45	834
		5	·6758	167. 23	265. 8	228. 30	−25. 56	835
		6	·7817	156. 20	251. 52	215. 14	−25. 22	835
		7	·8884	150. 33	238. 20	201. 42	−26. 26	836
		8	·8340	132. 53	239. 4	202. 26	−10. 5	837
		9	·2766	74. 27	280. 37	243. 59	+17. 0	833
		4530	·3150	80. 16	277. 38	241. 0	+16. 57	833
Oct. 2	275·452	1	·8060	278. 59	346. 12	281. 4	− 9. 44	831
		2	·4657	262. 5	317. 55	252. 47	− 9. 6	832
		3	·3140	214. 50	297. 47	232. 39	−11. 31	834
		4	·5320	202. 56	293. 7	227. 59	−25. 27	835
		5	·5763	181. 45	279. 48	214. 40	−25. 15	835
		6	·6967	167. 6	265. 36	200. 28	−27. 0	836

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Oct. 2		4537	·6136	143. 37	261. 29	196. 21	−10. 58	837
		8	·9792	102. 4	215. 43	150. 35	+15. 7	839
3	276·506	9	.9243	282. 7	1. 32	281. 27	−10. 25	831
		4540	·6394	274. 12	332. 45	252. 40	− 8. 42	832
		1	·4234	249. 9	313. 8	233. 3	−11. 50	834
		2	·5584	225. 31	307. 48	227. 43	−25. 22	835
		3	·5253	204. 25	295. 1	214. 56	−25. 5	835
		4	·5974	182. 23	280. 26	200. 21	−26. 47	836
		5	·6581	174. 7	272. 51	192. 46	−27. 51	836
		6	·9140	102. 39	229. 26	149. 21	+15. 1	839
		7	·9846	94. 45	214. 39	134. 34	+22. 14	840
4	277·456	8	·9778	284. 4	13. 9	279. 35	−10. 28	831
		9	·7739	279. 50	345. 26	251. 52	− 8. 25	832
		4550	·5638	264. 1	326. 3	232. 29	−11. 53	834
		1	·6316	241. 2	320. 24	226. 50	−25. 18	835
		2	·5544	200. 9	293. 13	199. 39	−26. 56	836
		3	·5727	192. 0	287. 55	194. 21	−27. 15	836
		4	·6025	105. 30	260. 1	166. 27	+11. 35	838
		5	·8229	102. 32	241. 26	147. 52	+14. 55	839
		6	·9537	95. 22	223. 37	130. 3	+21. 50	840
		7	·9283	107. 54	228. 23	134. 49	+10. 9	839
6	279·534	8	·9821	286. 10	16. 45	253. 43	− 8. 42	832
		9	·8585	277. 50	355. 18	232. 16	−12. 22	834
		4560	·8464	260. 45	348. 34	225. 32	−25. 28	835
		1	·6363	239. 42	321. 56	198. 54	−26. 14	836
		2	·1738	83. 18	290. 34	167. 32	+11. 37	838
		3	·2605	95. 41	284. 45	161. 43	+11. 20	838
		4	·4930	96. 56	270. 27	147. 25	+14. 55	839
		5	·6298	107. 17	260. 0	136. 58	+10. 34	839
		6	·7359	92. 51	252. 48	129. 46	+21. 25	840
		7	·8097	106. 44	244. 46	121. 44	+11. 28	842
		8	·8775	104. 19	237. 20	114. 18	+13. 33	842
8	281·400	9	·9793	268. 14	14. 28	224. 58	−25. 54	835
		4570	·8577	264. 39	353. 13	203. 43	−23. 5	835
		1	·8309	259. 19	348. 14	198. 44	−25. 53	836
		2	·2994	315. 12	317. 40	168. 10	+11. 25	838
		3	·2076	326. 16	311. 29	161. 59	+11. 58	838
		4	·1682	54. 20	296. 17	146. 47	+14. 39	839
		5	·2484	99. 20	287. 2	137. 32	+10. 8	839
		6	·4414	79. 6	278. 54	129. 24	+21. 10	840
		7	·4726	107. 10	272. 48	123. 18	+ 9. 46	842
		8	·6032	102. 33	264. 6	114. 36	+13. 13	842
9	282·599	9	·9293	265. 45	4. 18	197. 47	−25. 30	836
		4580	·9484	269. 59	8. 54	202. 23	−22. 38	836
		1	·2356	336. 29	312. 49	146. 18	+14. 40	839
		2	·0725	7. 23	303. 29	136. 58	+ 9. 59	839
		3	·2876	48. 49	295. 23	128. 52	+21. 23	840
		4	·2052	96. 14	290. 54	124. 23	+10. 0	842
		5	·3767	95. 6	281. 4	114. 33	+13. 30	842
		6	·9654	98. 58	226. 20	59. 49	+18. 23	843
		7	·9214	104. 13	234. 29	67. 58	+13. 33	843
12	285·510	8	·6037	244. 38	328. 51	121. 3	−22. 49	841
		9	·5674	237. 0	323. 20	115. 32	−23. 32	841

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Oct. 12		4590	·6364	305. 11	344. 33	136. 45	+10. 8	839
		1	·5564	327. 13	335. 48	128. 0	+21. 36	840
		2	·4925	306. 57	334. 22	126. 34	+10. 18	842
		3	·3092	314. 54	322. 19	114. 31	+11. 14	842
		4	·6773	98. 33	262. 59	55. 11	+16. 19	843
		5	·8758	137. 14	247. 17	39. 29	−15. 4	844
		6	·9503	134. 51	235. 58	28. 10	−15. 29	844
14	287·638	7	·8818	268. 18	3. 38	125. 39	−21. 19	841
		8	·8184	261. 47	354. 25	116. 26	−23. 45	841
		9	·9226	305. 6	14. 49	136. 50	+10. 18	839
		4600	·8381	304. 22	4. 17	126. 18	+ 9. 52	842
		1	·8543	318. 29	5. 22	127. 23	+21. 52	840
		2	·2699	73. 50	295. 14	57. 15	+16. 3	843
		3	·3318	81. 40	290. 41	52. 42	+16. 19	843
		4	·5539	159. 0	282. 4	44. 5	−16. 48	844
		5	·5942	151. 5	276. 57	38. 58	−14. 48	844
		6	·7278	143. 27	265. 10	27. 11	−15. 6	844
		7	·7764	140. 3	260. 9	22. 10	−14. 18	844
		8	·8673	129. 55	248. 49	10. 50	− 8. 46	844
16	289·663	9	·9744	270. 43	22. 7	115. 24	−23. 15	841
		4610	·9950	305. 9	33. 58	127. 15	+ 9. 26	842
		1	·9918	317. 51	33. 12	126. 29	+22. 7	840
		2	·3713	213. 9	311. 48	45. 5	−15. 58	844
		3	·3596	193. 47	304. 34	37. 51	−14. 55	844
		4	·4286	191. 22	302. 30	35. 47	−18. 50	844
		5	·4330	170. 50	294. 9	27. 26	−15. 12	844
		6	·4754	158. 50	288. 9	21. 26	−13. 30	844
		7	·5804	139. 4	276. 34	9. 51	− 8. 18	844
		8	·3247	333. 7	324. 47	58. 4	+16. 34	843
		9	·2509	345. 26	318. 56	52. 13	+16. 24	843
		4620	·9912	132. 50	228. 57	322. 14	−15. 35	848
17	290·492	1	·4263	238. 37	323. 39	45. 11	−15. 39	844
		2	·3668	222. 2	315. 54	37. 26	−15. 6	844
		3	·4168	213. 33	313. 12	34. 44	−18. 49	844
		4	·3611	194. 39	305. 42	27. 14	−15. 8	844
		5	·3699	177. 56	299. 39	21. 11	−13. 31	844
		6	·4353	149. 4	288. 22	9. 54	− 8. 30	844
		7	·4717	320. 54	336. 22	57. 54	+16. 17	843
		8	·8478	83. 8	254. 27	335. 59	+30. 40	847
		9	·9651	134. 44	237. 49	319. 21	−16. 15	848
19	292·505	4630	·6127	255. 43	341. 24	34. 23	−18. 38	844
		1	·6199	262. 37	344. 18	37. 17	−15. 23	844
		2	·5018	252. 10	333. 54	26. 53	−15. 19	844
		3	·4227	246. 20	328. 14	21. 13	−13. 36	844
		4	·3854	219. 46	317. 26	10. 25	−16. 34	844
		5	·2614	227. 50	317. 35	10. 34	− 8. 40	844
		6	·8063	312. 55	5. 26	58. 25	+16. 43	843
		7	·6415	166. 26	285. 19	338. 18	−24. 46	846
		8	·4749	168. 29	294. 26	347. 25	−16. 56	845
		9	·7727	140. 36	265. 27	318. 26	−15. 2	848
		4640	·6521	143. 6	275. 33	328. 32	−12. 55	848
		1	·8187	138. 14	260. 35	313. 34	−14. 41	848
		2	·5905	68. 38	284. 28	337. 27	+30. 26	847

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Oct. 20	293·418	4643	·7470	265. 2	355. 16	35. 18	−18. 40	844
		4	·7499	269. 45	357. 0	37. 2	−15. 33	844
		5	·6369	263. 42	346. 43	26. 45	−15. 27	844
		6	·5516	261. 13	340. 33	20. 35	−13. 36	844
		7	·3844	257. 48	330. 36	10. 38	− 8. 40	844
		8	·3858	191. 39	307. 12	347. 14	−16. 37	845
		9	·5425	181. 35	298. 42	338. 44	−24. 23	846
		4650	·6429	147. 7	278. 18	318. 20	−15. 3	848
		1	·6541	148. 53	278. 6	318. 8	−16. 27	848
22	295·453	2	·9565	278. 0	25. 30	36. 40	−15. 19	844
		3	·8885	275. 18	14. 28	25. 38	−15. 33	844
		4	·8379	276. 29	9. 0	20. 10	−13. 5	844
		5	·7263	279. 15	359. 27	10. 37	− 8. 17	844
		6	·5238	261. 41	341. 10	352. 20	−12. 28	845
		7	·3975	184. 30	306. 17	317. 27	−16. 37	848
		8	·3668	184. 54	307. 10	317. 20	−14. 55	848
		9	·8913	129. 7	253. 36	264. 46	− 9. 26	851
24	297·586	4660	·9614	285. 47	29. 52	10. 47	− 7. 58	844
		1	·4881	246. 18	336. 25	317. 20	−17. 0	848
		2	·4809	251. 3	337. 45	318. 40	−15. 3	848
		3	·1638	184. 44	313. 42	294. 37	− 3. 53	849
		4	·6128	171. 3	294. 28	275. 23	−25. 42	850
		5	·5823	139. 14	284. 28	265. 23	− 9. 21	851
		6	·9888	143. 50	239. 32	220. 27	−26. 58	853
		7	·9887	117. 39	236. 4	216. 59	− 1. 18	854
28	301·448	8	·9482	275. 25	29. 40	315. 47	−16. 58	848
		9	·9549	277. 48	31. 22	317. 29	−14. 58	848
		4670	·4145	261. 40	341. 18	267. 25	− 8. 53	851
		1	·2285	233. 38	327. 11	253. 18	− 7. 1	851
		2	·6895	164. 54	290. 50	216. 57	−27. 47	853
		3	·5954	126. 0	285. 13	211. 20	− 2. 47	854
		4	·7022	124. 27	277. 8	203. 15	− 3. 17	854
		5	·3148	78. 55	305. 42	231. 49	+15. 2	852
		6	·3635	81. 44	302. 35	228. 42	+15. 47	852
29	302·453	7	·7529	253. 26	0. 46	272. 39	−26. 24	850
		8	·6006	273. 1	356. 7	268. 0	− 9. 14	851
		9	·4141	265. 0	343. 2	254. 55	− 7. 44	851
		4680	·1848	30. 6	320. 54	232. 47	+15. 0	852
		1	·2154	52. 48	315. 55	227. 48	+15. 20	852
		2	·3046	142. 18	306. 14	218. 7	− 3. 45	854
		3	·4009	132. 10	299. 28	211. 21	− 2. 42	854
		4	·5279	128. 39	291. 7	203. 0	− 3. 22	854
		5	·5946	177. 58	304. 15	216. 8	−27. 39	853
30	303·492	6	·8751	261. 55	17. 30	274. 38	−25. 48	850
		7	·8279	259. 2	11. 9	268. 17	−25. 59	850
		8	·6201	276. 30	359. 14	256. 22	− 7. 41	851
		9	·2972	334. 58	336. 28	233. 36	+15. 14	852
		4690	·2679	354. 17	331. 5	228. 13	+17. 35	852
		1	·1301	158. 59	317. 36	214. 44	− 0. 52	854
		2	·1974	153. 25	314. 6	211. 14	− 2. 46	854
		3	·3155	138. 22	306. 11	203. 19	− 3. 5	854
		4	·5369	197. 9	318. 20	215. 28	−27. 42	853
		5	·9907	103. 30	240. 19	137. 27	+11. 44	858

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Nov. 1	305·478	4696	·9899	267. 39	43. 31	272. 29	−25. 43	850
		7	·6067	234. 13	344. 48	213. 46	−27. 49	853
		8	·4213	278. 35	348. 45	217. 43	− 2. 48	854
		9	·3161	273. 0	341. 58	210. 56	− 2. 39	854
		4700	·2178	257. 11	334. 52	203. 50	− 3. 28	854
		1	·6941	314. 13	7. 42	236. 40	+16. 36	852
		2	·0666	73. 55	322. 0	190. 58	+ 6. 36	856
		3	·8201	102. 47	269. 58	138. 56	+11. 54	858
		4	·9065	105. 18	259. 49	128. 47	+10. 0	858
		5	·8878	136. 43	265. 37	134. 35	−17. 33	859
		6	·9249	137. 53	260. 44	129. 42	−19. 49	859
2	306·461	7	·7003	246. 38	357. 58	212. 59	−27. 38	853
		8	·7077	249. 45	0. 2	215. 3	−26. 19	853
		9	·6194	284. 7	3. 22	218. 23	− 3. 2	854
		4710	·5079	281. 52	355. 32	210. 33	− 2. 44	854
		1	·8427	311. 47	22. 47	237. 48	+16. 54	852
		2	·7710	309. 21	15. 50	230. 51	+14. 10	852
		3	·6758	100. 58	283. 50	138. 51	+11. 54	858
		4	·7905	104. 51	273. 46	128. 47	+ 9. 53	858
		5	·8490	100. 18	268. 1	123. 2	+13. 56	858
		6	·7758	140. 27	279. 18	134. 19	−17. 13	859
		7	·8277	142. 9	274. 52	129. 53	−20. 14	859
3	307·506	8	·8048	255. 8	11. 41	211. 52	−27. 32	853
		9	·8152	257. 53	13. 51	214. 2	−26. 2	853
		4720	·7905	287. 21	18. 33	218. 44	− 2. 51	854
		1	·6903	286. 13	9. 57	210. 8	− 2. 31	854
		2	·9461	310. 40	38. 6	238. 17	+16. 59	852
		3	·4362	338. 0	346. 33	186. 44	+21. 15	857
		4	·4574	104. 13	300. 0	140. 11	+ 7. 58	858
		5	·4963	96. 9	298. 11	138. 22	+12. 11	858
		6	·5804	84. 35	294. 35	134. 46	+19. 51	858
		7	·6284	103. 10	288. 20	128. 31	+ 9. 51	858
		8	·7072	97. 34	282. 42	122. 53	+14. 22	858
		9	·6341	147. 5	293. 20	133. 31	−16. 54	859
		4730	·7028	148. 33	288. 58	129. 9	−20. 18	859
		1	·7890	148. 20	281. 46	121. 57	−23. 34	859
4	308·532	2	·9008	260. 31	25. 56	211. 35	−27. 38	853
		3	·7336	261. 56	9. 16	194. 55	−19. 54	855
		4	·9155	288. 59	33. 42	219. 21	− 2. 53	854
		5	·8415	287. 46	24. 40	210. 19	− 3. 1	854
		6	·4906	162. 21	308. 5	133. 44	−17. 53	859
		7	·5681	160. 15	303. 18	128. 57	−20. 44	859
		8	·7052	152. 34	291. 23	117. 2	−23. 2	859
		9	·2354	95. 45	314. 58	140. 37	+ 7. 54	858
		4740	·2932	84. 4	312. 58	138. 37	+12. 1	858
		1	·4234	98. 55	303. 33	129. 12	+ 9. 43	858
		2	·5286	92. 19	297. 35	123. 14	+14. 27	858
		3	·9794	95. 32	249. 16	74. 55	+18. 42	864
5	309·547	4	·9574	263. 54	37. 42	208. 57	−27. 1	853
		5	·8448	267. 44	22. 28	193. 43	−19. 26	855
		6	·9748	290. 20	45. 38	216. 53	− 2. 22	854
		7	·9344	289. 41	37. 38	208. 53	− 2. 21	854
		8	·7058	318. 45	11. 41	182. 56	+20. 6	857

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Nov. 5		4749	·6799	321. 33	9. 0	180. 15	+21. 21	857
		4750	·4623	178. 1	316. 40	127. 55	−20. 54	859
		1	·3797	186. 15	322. 11	133. 26	−17. 58	859
		2	·7181	149. 35	290. 19	101. 34	−21. 58	859
		3	·0798	18. 39	329. 23	140. 38	+ 8. 15	858
		4	·1508	36. 33	327. 1	138. 16	+12. 7	858
		5	·2282	82. 37	317. 34	128. 49	+10. 22	858
		6	·3492	79. 20	311. 42	122. 57	+14. 51	858
		7	·3566	36. 20	324. 5	135. 20	+23. 58	860
		8	·4739	52. 17	314. 8	125. 23	+28. 3	860
		9	·9226	121. 30	262. 30	73. 45	− 5. 46	863
		4760	·9138	94. 37	263. 19	74. 34	+18. 52	864
		1	·9465	95. 51	257. 51	69. 6	+18. 1	864
9	313·622	2	·7233	260. 35	13. 36	127. 3	−20. 5	859
		3	·7800	266. 6	20. 6	133. 33	−18. 12	859
		4	·6567	276. 23	12. 26	125. 53	− 8. 6	861
		5	·7981	301. 14	25. 50	139. 17	+ 8. 44	858
		6	·6782	304. 21	15. 20	128. 47	+10. 14	858
		7	·7935	320. 13	23. 2	136. 29	+23. 32	860
		8	·6960	330. 3	11. 30	124. 57	+27. 26	860
		9	·5074	230. 0	347. 41	101. 8	−23. 33	862
		4770	·5362	242. 0	354. 21	107. 48	−21. 23	862
		1	·2736	151. 51	320. 47	74. 14	− 6. 43	863
		2	·2949	142. 11	318. 11	71. 38	− 5. 9	863
		3	·3176	49. 51	324. 16	77. 43	+19. 34	864
		4	·3999	72. 5	314. 32	67. 59	+18. 7	864
		5	·8997	132. 10	271. 24	24. 51	−15. 51	865
		6	·9223	123. 48	266. 56	20. 23	− 8. 52	865
11	315·592	7	·9895	300. 55	56. 49	142. 19	+ 9. 1	858
		8	·9426	270. 46	42. 55	128. 25	−19. 2	859
		9	·8006	263. 37	23. 27	108. 57	−20. 30	862
		4780	·7419	259. 45	17. 1	102. 31	−21. 10	862
		1	·7238	253. 43	13. 19	98. 49	−24. 20	862
		2	·2877	355. 45	342. 45	68. 15	+17. 52	864
		3	·6465	141. 34	299. 18	25. 48	−15. 56	865
		4	·6618	129. 4	295. 21	20. 51	− 8. 40	865
		5	·9161	135. 29	271. 48	357. 18	−19. 48	866
		6	·9700	121. 14	259. 57	345. 27	− 7. 56	867
15	319·517	7	·9048	318. 22	41. 53	71. 43	+25. 33	864
		8	·8679	321. 18	36. 18	66. 8	+27. 10	864
		9	·8103	321. 33	29. 42	59. 32	+25. 46	864
		4790	·4075	240. 24	354. 26	24. 16	−15. 50	865
		1	·2918	250. 0	351. 44	21. 34	− 8. 31	865
		2	·2597	224. 49	345. 2	14. 52	−11. 8	865
		3	·3865	178. 27	329. 58	359. 48	−18. 14	866
		4	·5113	142. 58	312. 34	342. 24	−13. 15	867
		5	·4414	135. 33	315. 7	344. 57	− 8. 5	867
		6	·5509	92. 45	306. 48	336. 38	+12. 11	868
		7	·9380	89. 15	270. 3	299. 53	+21. 25	869
16	320·519	8	·9551	316. 7	51. 49	67. 26	+24. 45	864
		9	·9074	318. 36	43. 9	58. 46	+26. 2	864
		4800	·5510	256. 6	7. 15	22. 52	−16. 5	865
		1	·4734	266. 53	5. 49	21. 26	− 8. 51	865

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Nov. 16		4802	·3624	212. 2	344. 11	359. 48	−18. 16	866
		3	·3142	221. 55	346. 38	2. 15	−14. 32	866
		4	·2616	154. 11	328. 57	344. 34	− 7. 52	867
		5	·3460	80. 57	322. 12	337. 49	+12. 15	868
		6	·8645	87. 14	281. 50	297. 27	+21. 34	869
18	322·480	7	·8041	276. 38	34. 8	21. 56	− 9. 34	865
		8	·8330	269. 12	35. 42	23. 30	−16. 6	865
		9	·5841	253. 33	11. 22	359. 10	−18. 26	866
		4810	·3189	255. 1	357. 7	344. 55	− 8. 25	867
		1	·2258	334. 14	351. 26	339. 14	+11. 10	868
		2	·1747	0. 21	345. 25	333. 13	+11. 38	868
		3	·6003	76. 25	309. 44	297. 32	+21. 22	869
		4	·9731	132. 32	267. 24	255. 12	−20. 59	871
19	323·460	5	·9092	278. 20	47. 16	21. 10	− 9. 39	865
		6	·9246	271. 40	48. 38	22. 32	−16. 2	865
		7	·4980	268. 33	10. 45	344. 39	− 8. 35	867
		8	·4125	312. 54	5. 37	339. 31	+11. 8	868
		9	·3150	322. 4	358. 40	332. 34	+11. 37	868
		4820	·4654	64. 10	322. 38	296. 32	+21. 24	869
		1	·9070	134. 27	280. 57	254. 51	−21. 1	871
22	326·475	2	·9259	278. 23	52. 53	344. 1	− 9. 7	867
		3	·8903	300. 19	48. 27	339. 35	+10. 51	868
		4	·8267	303. 16	40. 58	332. 6	+12. 43	868
		5	·5360	327. 5	12. 40	303. 48	+20. 47	869
		6	·4557	336. 19	5. 14	296. 22	+21. 8	869
		7	·3481	168. 42	335. 29	266. 37	−15. 42	871
		8	·5349	154. 23	322. 22	253. 30	−20. 41	871
		9	·9053	120. 38	282. 4	213. 12	− 9. 44	872
		4830	·9545	120. 23	274. 11	205. 19	−10. 18	872
		1	·9748	136. 26	271. 23	202. 31	−26. 17	873
27	331·396	2	·9929	308. 52	73. 42	295. 2	+21. 32	869
		3	·9130	318. 45	53. 20	274. 40	+28. 43	870
		4	·8685	266. 45	48. 59	270. 19	−17. 7	871
		5	·6961	256. 22	30. 11	251. 31	−20. 1	871
		6	·3569	30. 32	345. 53	207. 13	+21. 22	874
		7	·3854	41. 14	341. 16	202. 36	+21. 39	874
		8	·3298	74. 44	334. 31	195. 51	+11. 16	875
		9	·4006	78. 47	329. 54	191. 14	+12. 3	875
		4840	·1886	205. 44	352. 30	213. 50	− 9. 34	872
		1	·4816	174. 30	339. 3	200. 23	−25. 8	873
		2	·3891	174. 11	341. 13	202. 33	−19. 35	873
		3	·4900	155. 34	330. 38	191. 58	−20. 17	873
		4	·6795	128. 20	310. 25	171. 45	−13. 12	876
		5	·7422	130. 6	305. 45	167. 5	−15. 51	876
		6	·7587	108. 53	301. 47	163. 7	− 0. 27	(876)
		7	·9273	98. 46	283. 12	144. 32	+ 8. 20	877
28	332·579	8	·8477	261. 55	46. 55	251. 28	−20. 20	871
		9	·3428	253. 52	8. 58	213. 31	− 9. 46	872
		4850	·4451	204. 38	355. 52	200. 25	−25. 4	873
		1	·3747	184. 16	347. 6	191. 39	−20. 22	873
		2	·3929	350. 34	2. 49	207. 22	+21. 30	874
		3	·1626	9. 0	353. 22	197. 55	+10. 13	875
		4	·2228	45. 44	345. 48	190. 21	+12. 11	875

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Nov. 28		4855	·3816	36. 19	344. 15	188. 48	+21. 58	874
		6	·4304	40. 46	341. 7	185. 40	+24. 3	874
		7	·4552	138. 34	328. 47	173. 20	−12. 52	876
		8	·5593	138. 35	322. 31	167. 4	−16. 10	876
		9	·5520	109. 2	318. 45	163. 18	− 0. 21	(876)
		4860	·8012	97. 17	299. 20	143. 53	+ 8. 15	877
Dec. 1	335·520	1	·8250	273. 31	49. 43	212. 33	− 9. 41	872
		2	·7442	250. 50	37. 4	199. 54	−24. 39	873
		3	·6228	250. 56	27. 56	190. 46	−20. 13	873
		4	·2939	231. 53	5. 15	168. 5	−13. 3	876
		5	·3020	205. 45	358. 10	161. 0	−16. 36	876
		6	·3029	193. 4	354. 12	157. 2	−16. 54	876
		7	·6741	300. 37	36. 21	199. 11	+10. 24	875
		8	·5752	306. 56	28. 13	191. 3	+12. 29	875
		9	·6266	313. 23	30. 27	193. 17	+17. 21	874
		4870	·6372	320. 32	29. 12	192. 2	+21. 45	874
		1	·5486	320. 31	23. 20	186. 10	+18. 43	874
		2	·2775	77. 32	340. 49	143. 39	+ 8. 6	877
		3	·6096	100. 38	317. 44	120. 34	+ 3. 36	878
		4	·8592	97. 23	296. 15	99. 5	+ 7. 29	880
		5	·9255	110. 19	287. 40	90. 30	− 3. 59	882
2	336·543	6	·9342	274. 31	64. 29	212. 49	− 9. 54	872
		7	·7687	257. 59	42. 36	190. 56	−20. 17	873
		8	·4682	253. 54	20. 15	168. 35	−13. 36	876
		9	·4134	240. 18	13. 44	162. 4	−16. 28	876
		4880	·3569	229. 31	8. 6	156. 26	−16. 37	876
		1	·8307	297. 47	51. 28	199. 48	+10. 34	875
		2	·7511	302. 9	43. 24	191. 44	+12. 50	875
		3	·7833	306. 49	45. 31	193. 51	+16. 56	874
		4	·7085	312. 16	37. 50	185. 50	+19. 1	874
		5	·1313	17. 21	355. 49	144. 9	+ 8. 0	877
		6	·7052	95. 13	311. 50	100. 10	+ 7. 26	880
		7	·7713	97. 22	306. 3	94. 23	+ 6. 26	880
		8	·8049	110. 33	302. 50	91. 10	− 3. 53	882
		9	·8673	85. 36	297. 34	85. 54	+17. 14	883
		4890	·9825	79. 48	278. 0	66. 20	+25. 8	884
		1	·5967	63. 20	327. 12	115. 32	+23. 52	879
		2	·8465	60. 37	307. 34	95. 54	+36. 46	881
9	343·496	3	·9167	282. 18	69. 17	118. 59	− 0. 17	878
		4	·7447	291. 33	50. 37	100. 19	+ 6. 30	880
		5	·9330	308. 46	69. 22	119. 4	+24. 15	879
		6	·8448	311. 43	56. 43	106. 25	+24. 7	879
		7	·6887	313. 25	41. 57	91. 39	+20. 23	883
		8	·4707	351. 54	13. 35	63. 17	+25. 39	884
		9	·2117	342. 53	9. 8	58. 50	+10. 11	885
		4900	·2064	11. 1	3. 22	53. 4	+11. 28	885
		1	·4325	144. 35	343. 33	33. 15	−17. 10	886
		2	·5386	120. 49	331. 57	21. 39	−10. 4	886
		3	·5537	139. 54	335. 19	25. 1	−19. 56	886
		4	·6779	130. 52	324. 8	13. 50	−19. 4	886
		5	·9609	91. 16	289. 39	339. 21	+10. 49	889
		6	·9245	68. 5	300. 6	349. 48	+31. 12	887
10	344·476	7	·9865	306. 56	83. 9	118. 57	+24. 27	879

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Dec. 10		4908	·9352	308. 37	70. 38	106. 26	+24. 31	879
		9	·8222	307. 48	56. 8	91. 56	+20. 34	883
		4910	·8732	289. 19	64. 25	100. 13	+ 6. 7	880
		1	·5676	333. 3	27. 17	63. 5	+25. 37	884
		2	·4870	345. 28	17. 56	53. 44	+25. 13	884
		3	·3738	311. 41	23. 15	59. 3	+10. 8	885
		4	·3098	324. 42	17. 27	53. 15	+11. 34	885
		5	·3176	173. 54	358. 9	33. 57	−18. 0	886
		6	·2897	136. 17	350. 5	25. 53	− 9. 50	886
		7	·4189	156. 5	348. 57	24. 45	−20. 14	886
		8	·8395	63. 13	314. 16	350. 4	+31. 19	887
		9	·9132	64. 24	304. 3	339. 51	+33. 2	887
		4920	·8728	89. 22	304. 13	340. 1	+10. 44	889
		1	·9869	94. 18	283. 46	319. 34	+ 7. 30	890
15	349·488	2	·8674	260. 30	67. 54	32. 37	−17. 11	886
		3	·7831	253. 4	57. 37	22. 20	−21. 17	886
		4	·5819	347. 54	23. 48	348. 31	+31. 26	887
		5	·5803	7. 50	10. 29	335. 12	+34. 9	887
		6	·2414	340. 10	16. 5	340. 48	+10. 55	889
		7	·2662	66. 13	356. 16	320. 59	+ 7. 18	890
		8	·3075	233. 8	21. 38	346. 21	−13. 57	888
		9	·3804	209. 0	16. 53	341. 36	−22. 5	888
		4930	·3823	199. 28	13. 8	337. 51	−23. 10	888
		1	·7658	69. 42	323. 49	288. 32	+21. 41	891
17	351·600	2	·9723	257. 13	86. 59	21. 44	−21. 14	886
		3	·6846	247. 46	50. 16	345. 1	−21. 41	888
		4	·6210	241. 2	43. 30	338. 15	−23. 27	888
		5	·6830	260. 34	52. 55	347. 40	−13. 21	888
		6	·5947	299. 23	45. 39	340. 24	+10. 52	889
		7	·3010	307. 39	26. 36	321. 21	+ 6. 58	890
		8	·7169	330. 3	43. 22	338. 7	+32. 41	887
		9	·7039	335. 36	39. 7	333. 52	+34. 43	887
		4940	·5616	45. 12	349. 42	284. 27	+25. 27	891
18	352·504	1	·8100	252. 2	63. 29	345. 25	−21. 57	888
		2	·7439	246. 52	53. 17	335. 13	−23. 53	888
		3	·7386	294. 45	58. 11	340. 7	+10. 56	889
		4	·4829	296. 15	39. 39	321. 35	+ 7. 9	890
		5	·8098	321. 37	56. 25	338. 21	+32. 31	887
		6	·7880	326. 57	51. 32	333. 28	+34. 56	887
		7	·4842	25. 21	3. 10	285. 6	+25. 57	891
		8	·5792	124. 20	340. 3	261. 59	−12. 51	893
19	353·506	9	·8711	291. 25	72. 34	340. 17	+10. 54	889
		4950	·6673	290. 45	54. 0	321. 43	+ 7. 16	890
		1	·3838	136. 45	355. 13	262. 56	−15. 26	893
		2	·3073	116. 50	356. 14	263. 57	− 7. 16	892
		3	·3814	112. 33	351. 28	259. 11	− 7. 2	892
		4	·8733	320. 30	64. 50	332. 33	+35. 8	887
		5	·4726	358. 0	18. 22	286. 5	+25. 59	891
		6	·4215	357. 11	18. 2	285. 45	+22. 43	891
		7	·9465	115. 17	302. 41	210. 24	−16. 58	895
		8	·7875	78. 10	323. 30	231. 13	+14. 19	894
		9	·9700	83. 42	298. 21	206. 4	+13. 19	896
20	354·500	4960	·9549	289. 21	85. 59	339. 36	+10. 49	889

1860.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Dec. 20		4961	·8136	287. 46	67. 47	321. 24	+ 7. 20	890
		2	·2456	172. 14	10. 15	263. 52	−15. 22	893
		3	·3057	162. 58	6. 36	260. 13	−17. 50	893
		4	·1007	167. 21	12. 13	265. 50	− 7. 10	892
		5	·1887	128. 54	4. 55	258. 32	− 7. 22	892
		6	·5845	67. 23	342. 41	236. 18	+15. 27	894
		7	·6521	72. 13	336. 47	230. 24	+14. 40	894
		8	·8908	115. 4	312. 10	205. 47	−16. 28	895
		9	·8370	114. 55	318. 29	212. 6	−15. 32	895
		4970	·8829	81. 17	313. 48	207. 25	+13. 18	896
		1	·9475	79. 56	304. 26	198. 3	+15. 55	896
24	358·579	2	·7678	257. 10	67. 16	263. 2	−15. 24	893
		3	·8107	267. 22	72. 15	268. 1	− 7. 53	892
		4	·9359	302. 17	84. 15	280. 1	+24. 1	891
		5	·1995	187. 19	18. 43	214. 29	−13. 43	895
		6	·5111	310. 43	43. 50	239. 36	+15. 2	894
		7	·3911	326. 11	33. 9	228. 55	+15. 21	894
		8	·6117	132. 20	346. 16	182. 2	−23. 22	897
		9	·2559	17. 55	15. 8	210. 54	+12. 9	896
		4980	·3902	43. 42	3. 54	199. 40	+15. 34	896
		1	·9357	85. 47	309. 52	145. 38	+ 8. 13	899
26	360·501	2	·9653	259. 37	95. 0	263. 30	−15. 3	893
		3	·5186	259. 17	50. 40	219. 10	− 9. 58	895
		4	·8083	294. 53	71. 40	240. 10	+14. 43	894
		5	·3770	167. 25	13. 22	181. 52	−23. 30	897
		6	·4583	308. 59	42. 58	211. 28	+12. 39	896
		7	·3705	333. 31	31. 41	200. 11	+15. 59	896
		8	·5649	132. 45	351. 40	160. 10	−22. 34	898
		9	·4976	127. 24	354. 21	162. 51	−17. 51	898
		4990	·8209	118. 44	327. 7	135. 37	−21. 7	900
		1	·6349	81. 0	342. 3	150. 33	+ 6. 33	899
		2	·7042	80. 31	336. 51	145. 21	+ 7. 59	899
Jan. 2 1861	1·544	3	·9615	248. 6	101. 12	169. 48	−23. 1	898
		4	·8977	280. 21	90. 20	158. 56	+ 6. 46	899
		5	·8270	281. 23	82. 11	150. 47	+ 6. 33	899
		6	·7844	284. 39	77. 39	146. 15	+ 8. 26	899
		7	·6219	257. 33	65. 16	133. 52	−10. 59	901
		8	·5806	254. 42	61. 59	130. 35	−12. 8	901
		9	·3991	213. 23	40. 44	109. 20	−22. 52	902
		5000	·3543	213. 28	39. 3	107. 39	−20. 35	902
		1	·1909	326. 45	33. 36	102. 12	+ 5. 43	903
		2	·3203	338. 10	34. 47	103. 23	+13. 47	903
		3	·8950	108. 56	324. 26	33. 2	−17. 23	905
		4	·7746	67. 23	340. 7	48. 43	+15. 53	904
		5	·8108	65. 46	337. 10	45. 46	+18. 9	904
		6	·7441	56. 34	346. 4	54. 40	+22. 24	904
3	2·531	7	·7946	258. 29	80. 42	135. 18	−11. 42	901
		8	·7425	257. 14	75. 52	130. 28	−12. 12	901
		9	·5472	238. 7	57. 42	112. 18	−20. 2	902
		5010	·9334	278. 56	96. 32	151. 8	+ 6. 27	899
		1	·9008	281. 49	91. 30	146. 6	+ 8. 30	899
		2	·3650	295. 49	47. 43	102. 19	+ 5. 40	903
		3	·7829	109. 55	337. 58	32. 34	−17. 8	905

1861.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Jan. 3		5014	·6222	60. 1	354. 48	49. 24	+15. 33	904
		5	·8918	68. 37	328. 22	22. 58	+17. 48	906
4	3·578	6	·9326	259. 17	98. 21	138. 6	−11. 23	901
		7	·8702	258. 13	89. 48	129. 33	−12. 6	901
		8	·7160	245. 22	73. 4	112. 49	−19. 58	902
		9	·9937	277. 54	112. 17	152. 2	+ 7. 17	899
		5020	·9770	280. 10	106. 8	145. 53	+ 9. 0	899
		1	·5730	285. 46	63. 2	102. 47	+ 5. 54	903
		2	·4495	43. 54	10. 44	50. 29	+15. 30	904
		3	·4994	48. 46	6. 38	46. 23	+15. 55	904
		4	·7603	62. 33	345. 31	25. 16	+18. 3	906
		5	·6204	113. 3	353. 0	32. 45	−16. 47	905
		6	·8633	104. 42	330. 8	9. 53	−14. 20	907
6	5·493	7	·8584	277. 38	89. 42	102. 17	+ 5. 16	903
		8	·2787	147. 37	22. 40	35. 15	−17. 23	905
		9	·3010	138. 20	19. 35	32. 10	−16. 46	905
		5030	·5722	109. 53	357. 58	10. 33	−14. 45	907
		1	·3422	336. 15	39. 19	51. 54	+14. 34	904
		2	·3355	354. 48	32. 57	45. 32	+15. 42	904
		3	·8945	74. 43	329. 41	342. 16	+11. 8	908
7	6·598	4	·9560	275. 27	104. 44	101. 39	+ 5. 18	903
		5	·2839	214. 51	42. 36	39. 31	−17. 0	905
		6	·2256	188. 30	34. 51	31. 46	−16. 39	905
		7	·3776	120. 38	13. 16	10. 11	−15. 8	907
		8	·4498	111. 30	7. 26	4. 21	−13. 31	907
		9	·6998	300. 24	71. 16	68. 11	+18. 31	904
		5040	·4356	318. 50	49. 20	46. 15	+15. 46	904
		1	·3590	14. 2	26. 53	23. 48	+16. 18	906
		2	·7654	70. 23	344. 56	341. 51	+11. 15	908
8	7·472	3	·4316	234. 32	55. 27	39. 58	−17. 28	905
		4	·3160	223. 14	46. 52	31. 23	−16. 43	905
		5	·8181	294. 25	84. 1	68. 32	+18. 36	904
		6	·6300	297. 34	67. 53	52. 24	+14. 39	904
		7	·2358	145. 50	25. 56	10. 27	−15. 22	907
		8	·2839	125. 0	19. 58	4. 29	−13. 35	907
		9	·6288	64. 24	357. 40	342. 11	+11. 28	908
9	8·451	5050	·6089	243. 41	69. 58	40. 35	−17. 39	905
		1	·4848	238. 59	60. 43	31. 20	−17. 6	905
		2	·9266	290. 18	99. 7	69. 44	+19. 4	904
		3	·1884	193. 59	37. 32	8. 9	−14. 26	907
		4	·4606	52. 34	11. 56	342. 33	+11. 35	908
		5	·5353	64. 59	4. 39	335. 16	+ 8. 24	908
		6	·9444	98. 16	323. 29	294. 6	−11. 15	909
16	15·540	7	·8284	281. 18	95. 19	325. 23	+11. 6	908
		8	·3830	248. 14	63. 31	293. 35	−10. 32	909
		9	·3106	356. 41	40. 55	270. 59	+13. 13	910
		5060	·3782	33. 6	27. 42	257. 46	+12. 27	910
		1	·9136	83. 21	335. 53	205. 57	− 1. 0	911
26	25·460	2	·9066	261. 53	116. 28	205. 50	− 0. 39	911
		3	·2522	244. 26	65. 56	155. 18	− 9. 19	914
		4	·1354	187. 11	54. 5	143. 27	−13. 2	914
		5	·4291	308. 15	68. 42	158. 4	+13. 13	913
		6	·4018	302. 45	69. 6	158. 28	+10. 24	913

1861.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Jan. 26		5067	·8393	85. 37	354. 30	83. 52	− 7. 50	916
		8	·6649	44. 0	17. 20	106. 42	+18. 16	915
		9	·7575	58. 6	5. 52	95. 14	+12. 26	915
27	26·482	5070	·9735	260. 45	129. 21	204. 13	− 1. 5	911
		1	·4907	250. 37	82. 4	156. 56	− 9. 19	914
		2	·2922	232. 41	68. 14	143. 6	−13. 13	914
		3	·4994	286. 29	79. 22	154. 14	+ 7. 56	913
		4	·5190	30. 5	32. 6	106. 58	+17. 47	915
		5	·6813	85. 7	9. 45	84. 37	− 8. 0	916
28	27·582	6	·7051	250. 58	98. 48	158. 4	− 9. 47	914
		7	·7786	237. 26	104. 14	163. 30	−20. 22	912
		8	·5059	241. 58	83. 36	142. 52	−13. 34	914
		9	·6704	275. 44	94. 1	153. 17	+ 6. 39	913
		5080	·4100	2. 17	48. 16	107. 32	+17. 18	915
		1	·4894	86. 7	24. 37	83. 53	− 8. 31	916
29	28·469	2	·8779	239. 30	116. 14	162. 55	−19. 35	912
		3	·8344	251. 13	111. 34	158. 15	− 9. 26	914
		4	·6623	245. 28	96. 4	142. 45	−13. 6	914
		5	·8060	271. 38	106. 52	153. 33	+ 6. 49	913
		6	·5489	301. 5	79. 40	126. 21	+16. 20	915
		7	·4196	332. 4	62. 0	108. 41	+17. 47	915
		8	·3464	87. 28	32. 49	79. 30	− 8. 32	916
31	30·550	9	·9883	263. 44	137. 16	154. 26	+ 4. 53	913
		5090	·9335	248. 37	126. 22	143. 32	−10. 43	914
		1	·9572	246. 7	130. 43	147. 53	−12. 54	914
		2	·5081	294. 22	81. 28	98. 38	+12. 6	915
		3	·4194	303. 25	74. 16	91. 26	+11. 38	915
		4	·8644	96. 26	357. 4	14. 14	−19. 5	920
		5	·6919	25. 22	28. 31	45. 41	+27. 53	918
Feb. 2	32·530	6	·6462	349. 26	57. 2	46. 7	+33. 53	918
		7	·1998	2. 38	55. 51	44. 56	+ 4. 54	919
4	34·559	8	·1345	163. 45	60. 40	20. 58	−13. 58	920
7	37·592	9	·9766	237. 33	142. 49	60. 6	−18. 24	917
		5100	·8905	267. 33	125. 15	42. 32	+ 8. 3	919
		1	·8241	271. 23	117. 11	34. 28	+ 9. 33	919
		2	·7144	240. 0	109. 32	26. 49	−15. 12	920
		3	·6518	242. 5	104. 39	21. 56	−13. 18	920
		4	·2090	83. 37	52. 6	329. 23	− 8. 6	921
10	40·556	5	·5178	250. 52	98. 22	333. 36	− 7. 14	921
		6	·1929	221. 50	76. 41	311. 55	−12. 23	922
		7	·6002	21. 46	43. 46	279. 0	+22. 8	923
		8	·6725	25. 49	37. 43	272. 57	+24. 13	923
		9	·8574	54. 15	11. 20	246. 34	+13. 6	924
		5110	·9852	98. 41	345. 14	220. 28	−25. 26	927
12	42·534	1	·7807	248. 1	120. 42	327. 53	− 8. 25	921
		2	·5109	337. 14	72. 26	279. 37	+23. 43	923
		3	·5055	353. 38	63. 27	270. 38	+23. 1	923
		4	·8427	99. 25	12. 22	219. 33	−25. 34	927
		5	·5881	39. 7	39. 12	246. 23	+13. 24	924
		6	·7647	76. 35	19. 4	226. 15	− 6. 52	925
		7	·9219	72. 19	2. 5	209. 16	− 2. 0	925
		8	·8830	60. 33	8. 55	216. 6	+ 7. 53	926
		9	·9166	59. 54	4. 40	211. 51	+ 9. 21	926

1861.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Feb. 17	47·494	5120	·6386	282. 56	108. 9	244. 59	+13. 39	924
		1	·3075	245. 46	92. 5	228. 55	− 8. 20	925
		2	·1995	253. 48	85. 40	222. 30	− 6. 19	925
		3	·2550	210. 24	85. 38	222. 28	−16. 23	928
		4	·2080	177. 7	77. 30	214. 20	−18. 23	928
		5	·3515	175. 4	79. 24	216. 14	−26. 46	927
		6	·2747	324. 45	78. 44	215. 34	+ 8. 18	926
		7	·0909	17. 45	71. 5	207. 55	− 2. 42	925
		8	·2767	115. 11	62. 4	198. 54	−17. 42	928
		9	·3633	103. 40	55. 24	192. 14	−17. 37	928
		5130	·9305	93. 2	4. 52	141. 42	−22. 27	931
		1	·4829	36. 48	50. 32	187. 22	+ 9. 37	929
		2	·8351	60. 56	18. 54	155. 44	+ 4. 57	930
		3	·9664	58. 59	0. 59	137. 49	+10. 13	930
26	56·440	4	·6809	221. 25	124. 18	134. 14	−23. 43	931
		5	·7671	264. 47	131. 6	141. 2	+ 7. 19	930
		6	·5622	296. 10	106. 45	116. 41	+17. 46	932
		7	·4777	313. 35	95. 55	105. 51	+18. 31	932
		8	·7338	52. 29	38. 15	48. 11	+ 6. 58	936
		9	·8582	54. 37	26. 14	36. 10	+ 8. 24	936
27	57·486	5140	·8191	225. 6	138. 53	133. 58	−23. 19	931
		1	·8824	261. 24	144. 20	139. 25	+ 7. 41	930
		2	·7042	283. 22	121. 37	116. 42	+17. 46	932
		3	·5919	294. 12	110. 6	105. 11	+18. 30	932
		4	·5555	44. 43	53. 39	48. 44	+ 6. 52	936
		5	·7136	49. 35	41. 29	36. 34	+ 8. 15	936
28	58·454	6	·9162	225. 26	152. 16	133. 38	−23. 53	931
		7	·9660	258. 26	158. 43	140. 5	+ 7. 41	930
		8	·8223	276. 5	134. 59	116. 21	+17. 51	932
		9	·7218	283. 12	123. 51	105. 13	+18. 43	932
		5150	·4231	333. 1	87. 38	69. 0	+17. 40	933
		1	·3336	106. 31	69. 14	50. 36	−18. 42	934
		2	·3900	30. 36	67. 15	48. 37	+ 6. 59	936
		3	·7027	27. 7	50. 46	32. 8	+21. 43	935
		4	·5604	41. 38	54. 13	35. 35	+ 8. 26	936
		5	·6311	46. 37	49. 9	30. 31	+ 7. 45	936
		6	·9339	81. 51	15. 21	356. 43	−15. 3	937
		7	·9743	84. 52	6. 58	348. 20	−17. 34	937
Mar. 3	61·649	8	·5050	225. 14	117. 37	53. 40	−17. 20	934
		9	·9885	266. 40	166. 42	102. 45	+17. 27	932
		5160	·8361	271. 13	140. 51	76. 54	+15. 12	933
		1	·7776	275. 30	134. 3	70. 6	+16. 18	933
		2	·3364	298. 22	100. 50	36. 53	+ 8. 2	936
		3	·2897	310. 5	96. 13	32. 16	+ 7. 43	936
		4	·2566	338. 13	88. 19	24. 22	+ 7. 38	936
		5	·3917	15. 46	74. 17	10. 20	+10. 56	936
		6	·4631	92. 1	62. 21	358. 24	−17. 25	937
		7	·6267	87. 43	50. 23	346. 26	−18. 4	937
		8	·7455	84. 29	40. 20	336. 23	−17. 17	937
		9	·8759	87. 34	26. 56	322. 59	−20. 52	938
		5170	·9249	91. 9	20. 5	316. 8	−24. 25	938
4	62·576	1	·9398	266. 59	156. 1	78. 55	+15. 34	933
		2	·8676	271. 32	145. 1	67. 55	+16. 45	933

1861.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Mar. 4		5173	·6803	230. 5	131. 59	54. 53	−16. 59	934
		4	·4874	279. 2	114. 6	37. 0	+ 8. 14	936
		5	·3262	298. 46	101. 13	24. 7	+ 7. 41	936
		6	·3116	341. 58	87. 58	10. 52	+10. 51	936
		7	·2906	107. 16	75. 56	358. 50	−17. 39	937
		8	·4540	94. 32	64. 19	347. 13	−18. 24	937
		9	·7724	88. 55	39. 15	322. 9	−21. 4	938
7	65·490	5180	·8957	259. 41	154. 1	35. 35	+ 8. 10	936
		1	·7576	267. 17	138. 21	19. 55	+10. 25	936
		2	·6213	274. 57	126. 8	7. 42	+11. 4	936
		3	·4325	221. 35	116. 25	357. 59	−17. 8	937
		4	·3174	117. 19	79. 55	321. 29	−21. 7	938
		5	·8143	76. 38	37. 25	278. 59	−12. 9	940
9	67·435	6	·9543	261. 10	164. 33	18. 31	+11. 40	936
		7	·8923	263. 59	154. 35	8. 33	+12. 5	936
		8	·7659	230. 47	144. 23	358. 21	−16. 34	937
		9	·3259	197. 43	107. 33	321. 31	−21. 5	938
		5190	·3309	66. 14	74. 56	288. 54	− 6. 40	940
		1	·5015	82. 17	64. 37	278. 35	−14. 3	940
		2	·9128	75. 37	27. 48	241. 46	−11. 14	942
10	68·450	3	·8943	231. 40	159. 24	358. 58	−16. 10	937
		4	·9779	259. 40	171. 9	10. 43	+11. 29	936
		5	·4858	215. 26	121. 43	321. 17	−20. 45	938
		6	·3138	234. 42	113. 27	313. 1	−10. 22	939
		7	·0736	59. 38	91. 7	290. 41	− 6. 38	940
		8	·4121	16. 43	79. 33	279. 7	+11. 19	941
		9	·4811	21. 27	74. 53	274. 27	+13. 3	941
		5200	·7960	75. 0	42. 12	241. 46	−11. 18	942
11	69·492	1	·9759	230. 21	175. 2	359. 50	−16. 47	937
		2	·6574	221. 17	136. 6	320. 54	−21. 27	938
		3	·5520	237. 43	129. 58	314. 46	−10. 30	939
		4	·1911	243. 2	107. 25	292. 13	− 7. 33	940
		5	·3311	335. 12	96. 39	281. 27	+12. 7	941
		6	·3641	354. 58	89. 26	274. 14	+12. 59	941
		7	·6327	75. 0	56. 58	241. 46	−11. 11	942
		8	·9471	90. 55	24. 3	208. 51	−25. 49	944
12	70·572	9	·8177	224. 40	152. 11	321. 40	−21. 19	938
		5210	·7503	238. 38	146. 22	315. 51	−10. 5	939
		1	·6615	234. 59	138. 59	308. 28	−12. 28	939
		2	·4598	246. 31	124. 52	294. 21	− 5. 59	940
		3	·4217	297. 57	112. 46	282. 15	+12. 31	941
		4	·3616	315. 45	104. 44	274. 13	+12. 43	941
		5	·8678	91. 15	37. 25	206. 54	−25. 31	944
		6	·9141	84. 56	30. 39	200. 8	−20. 19	944
		7	·9451	73. 21	25. 57	195. 26	− 9. 25	946
13	71·611	8	·9244	225. 55	166. 54	321. 38	−20. 54	938
		9	·8930	237. 52	162. 16	317. 0	−10. 7	939
		5220	·8151	235. 35	153. 30	308. 14	−12. 17	939
		1	·5759	242. 42	133. 48	288. 32	− 7. 29	940
		2	·5796	279. 47	127. 51	282. 35	+12. 46	941
		3	·4959	286. 37	120. 57	275. 41	+12. 22	941
		4	·7264	94. 45	53. 53	208. 37	−25. 46	944
		5	·8070	85. 38	44. 47	199. 31	−20. 16	944

1861.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	′	
Mar. 13		5226	·8610	77. 33	38. 34	193. 18	−13. 50	946
		7	·8519	71. 50	39. 42	194. 26	− 8. 58	946
14	72·446	8	·9884	225. 49	182. 19	325. 13	−20. 27	938
		9	·9620	236. 48	174. 10	317. 4	−10. 17	939
		5230	·7752	242. 36	150. 21	293. 15	− 6. 43	940
		1	·7110	271. 32	140. 7	283. 1	+12. 49	941
		2	·6252	276. 42	132. 29	275. 23	+12. 56	941
		3	·6318	97. 13	63. 6	206. 0	−25. 6	944
		4	·5293	5. 59	82. 47	225. 41	+20. 16	943
		5	·5439	12. 0	79. 23	222. 17	+19. 11	943
		6	·6936	87. 28	56. 15	199. 9	−20. 13	944
		7	·7269	70. 32	52. 28	195. 22	− 8. 30	946
15	73·477	8	·9078	240. 22	165. 56	294. 12	− 7. 27	940
		9	·8559	241. 24	159. 29	287. 45	− 7. 1	940
		5240	·8442	265. 11	154. 37	282. 53	+12. 34	941
		1	·7704	267. 1	147. 11	275. 27	+11. 43	941
		2	·4596	338. 54	98. 38	226. 54	+20. 8	943
		3	·4658	350. 31	92. 58	221. 14	+19. 36	943
		4	·4850	107. 6	76. 54	205. 10	−25. 16	944
		5	·5346	93. 43	70. 18	198. 34	−20. 48	944
		6	·5377	69. 54	67. 43	195. 59	− 8. 23	946
		7	·5828	74. 25	64. 39	192. 55	−11. 1	946
		8	·8943	76. 50	36. 20	164. 36	−13. 24	947
		9	·9799	76. 13	20. 58	149. 14	−12. 1	949
18	76·446	5250	·1313	229. 43	110. 41	196. 50	− 8. 53	946
		1	·3057	296. 49	114. 15	200. 24	+ 7. 1	945
		2	·3076	83. 17	86. 3	172. 12	−12. 12	947
		3	·3881	74. 50	80. 35	166. 44	−10. 16	947
		4	·4395	70. 55	77. 12	163. 21	− 8. 54	947
		5	·6647	76. 2	61. 36	147. 45	−12. 35	949
		6	·7217	48. 16	59. 23	145. 32	+ 6. 54	950
		7	·9759	43. 30	29. 37	115. 46	+19. 2	951
21	79·448	8	·7349	237. 20	153. 54	197. 28	− 9. 57	946
		9	·4402	227. 52	131. 56	175. 30	−13. 26	947
		5260	·3877	270. 13	126. 44	170. 18	+ 3. 11	948
		1	·1050	138. 5	104. 37	148. 11	−12. 38	949
		2	·2428	351. 41	102. 14	145. 48	+ 6. 30	950
		3	·6918	27. 19	70. 49	114. 23	+19. 6	951
		4	·8682	69. 36	45. 48	89. 22	− 7. 48	952
		5	·8301	42. 12	54. 10	97. 44	+14. 2	951
		6	·9344	45. 24	40. 27	84. 1	+15. 5	951
22	80·440	7	·8724	237. 27	168. 28	197. 58	− 9. 25	946
		8	·6312	231. 56	146. 26	175. 56	−13. 9	947
		9	·5561	260. 15	139. 35	169. 5	+ 2. 55	948
		5270	·2137	218. 21	118. 36	148. 6	−12. 5	949
		1	·2835	300. 7	116. 33	146. 3	+ 6. 44	950
		2	·5612	14. 51	84. 49	114. 19	+18. 53	951
		3	·7302	68. 46	60. 14	89. 44	− 7. 51	952
		4	·6825	33. 48	70. 4	99. 34	+14. 52	951
		5	·8381	40. 58	54. 39	84. 9	+15. 21	951
23		6	·9495	58. 11	36. 32	66. 2	+ 3. 42	953
	81·620	7	·8102	232. 59	162. 57	175. 43	−13. 8	947
		8	·4531	231. 38	135. 14	148. 0	−11. 46	949

1861.	Day.	No.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.	Group.
				° ′	° ′	° ′	° ′	
Mar. 23		5279	·4569	350. 13	100. 55	113. 41	+19. 13	951
		5280	·5071	17. 4	87. 40	100. 26	+15. 26	951
		1	·5252	69. 30	76. 44	89. 30	− 8. 31	952
		2	·6931	32. 56	70. 43	83. 29	+15. 45	951
		3	·8639	53. 39	50. 11	62. 57	+ 5. 38	953
24	82·424	4	·6061	233. 47	146. 39	148. 1	−11. 41	949
		5	·4413	328. 27	112. 0	113. 22	+19. 10	951
		6	·4146	358. 53	99. 1	100. 23	+15. 23	951
		7	·3565	69. 59	88. 24	89. 46	− 8. 22	952
		8	·5878	24. 12	81. 29	82. 51	+16. 10	951
		9	·7317	52. 27	63. 37	64. 59	+ 3. 51	953
		5290	·9671	52. 39	35. 47	37. 9	+ 9. 20	954

SECTION III.

DISCUSSION OF THE FOREGOING OBSERVATIONS IN GROUPS, PRINCIPALLY FOR THE DETERMINATION OF THE DIURNAL MOTION IN LONGITUDE AND LATITUDE, FOR THE AFTER-DETERMINATION OF THE TRUE ROTATION OF THE SURFACE OF THE SUN AS INDICATED BY THE MEAN MOTIONS OF THE SPOTS IN CONNECTION WITH THE PROVISIONAL PERIOD OF ROTATION ASSUMED FOR THE PURPOSE OF REDUCTION.

The numbers prefixed to each paragraph are those of the groups in the table of deduced positions and in the sheets of diagrams. Where a group returns to view during a second or third rotation, the whole of the observations are commonly discussed together. The signs prefixed to the concluded diurnal motions are such that + in longitude indicates rotation faster than 14° 11′ per diem (corresponding to the assumed period of 25·380 days), and + in latitude motion towards either Pole. The three data of each line representing an observation, are—1. The time expressed in days of the year and decimals; 2. The heliographical longitude cleared of rotation at the rate of 14° 11′ per diem, and given in degrees and one place of decimals; and, 3. The latitude similarly given. Notes on remarkable divergence, unusual motions, or recurrence in the same region are added where they occur, for comparison and collection afterwards.

1. A single spot.

	d	°	°
at 312·5	. . 293·9	. . +5·2
320·5	. . 296·6	. . +4·6

Diurnal motions +21′ and −4′ . . . for latitude +5°.

2, 7, and 15. Irregular groups. I deduce the following data from the diagrams.

at 324·5 . .	254·0 . .	+12·5
345·5 . .	257·0 . .	+10·5

Diurnal motions +9′ and −6′ . . . . for lat. +12°.

Also at 352·5 . .	249·5 . .	+11·0
377·5 . .	251·5 . .	+ 7·0

Diurnal motions +5′ and −10′ . . . . for lat. +9°.

6 and 14. Circular spots. First observation near the limb. We may replace the originals by the means.

at 342·0 . .	345·1 . .	−12·1
368·5 . .	346·9 . .	−12·0

Diurnal motions +4′ and zero . . . . for lat. −12°.

10. Two dots diverging by 3 degrees per diem.

11. Mere dots. Compare as follows.

at 359·5 . .	95·9 . .	+12·2
362·0 . .	96·2 . .	+11·5

Diurnal motions +8′ and −16′ . . . . for lat. +12°.

Groups here follow which afford little or no matter for discussion, and are passed without remark.

22 and 26. Exhibiting divergence in a marked degree. The first line of data is formed from the mean of the observations on the 12th, 13th, and 14th, the second from those of the 16th and 18th.

at 43·52 . .	152·0 . .	−6·8
47·52 . .	154·0 . .	−7·2

Diurnal motions +30′ and +6′ . . . . for lat. −7°.

The motion in latitude is somewhat uncertain by reason of change of figure which does not equally affect the result for the longitude. The two principal nuclei separate by about 80′ per diem, more rapidly than this at first, and afterwards less.

25 and 31. No trace of 25 existed on March 6th, and the two dots recorded on the 9th can hardly be identified with any distinct part of the fine double group recorded on the 11th. I deduce for the principal nuclei of 25

			Mean between.		Dist.
at 69·50 . .	203·7 . .	+6·8			
	197·1 . .	+9·2 . .	200°·4 . .	+8°·0 . .	6°·6
70·52 . .	204·6 . .	+6·3			
	196·8 . .	+9·2 . .	200·7 . .	+7·8 . .	7·8
71·53 . .	204·5 . .	+6·1			
	196·5 . .	+9·4 . .	200·5 . .	+7·7 . .	8·2

then for 31 the next appearance,

	Principal Nuclei.		Mean between.		Dist.
at 90·59	206·6	+4·8			
	198·8	+9·6	202°·7	+7°·2	9°·1
91·56	206·4	+4·5			
	198·3	+9·1	202·4	+6·8	9·4
94·55	206·0	+4·2			
	198·0	+9·0	202·0	+6·6	8·8
95·57	205·8	+4·3			
	197·8	+8·8	201·8	+6·6	9·0
97·51	205·9	+3·9			
	197·8	+9·0	201·8	+6·4	9·8

From these on the whole would result

Diurnal motions + 4′ and −2′ . . . . for lat. +7°.

and a divergence at last barely perceptible.

27 and 34. Observed as follows

at 75·48	121·8	+17·2 and	112·3	+16·4	Dist. 10·2
79·60	124·4	+17·8	111·7	+16·6	12·8
97·51	130·5	+18·8	gone		

From the two first there result means

at 75·5	117·1	+16·8
79·6	118·1	+17·2 whence

Diurnal motions +15′ and +6′ . . . . for lat. +17°.

Divergence considerable, about 36′ per diem, even when the distance between the nuclei exceeds 10°.

24 and 29. The single observation of 24 indicates that two nuclei broke out on March 1st, at a distance apart of $2\frac{1}{2}$ degrees in the mean position 26·5 by +10·5. Omitting the observation of 29 on March 17th as too near the limb, we next find these nuclei in a mean position of 38·2 by +7·5 at a distance apart of 9 degrees on March 21st. There result

Diurnal motions +35′ and −9′ . . . . for lat. +9°.

and a divergence of 20′ per diem on the mean of 20 days, doubtless more at first and less afterwards. The observations of the circular spot 29, as under, are of no use as data for diurnal motion, the spot still retaining its divergence from its former companion.

at 79·60	34·0	by +9·0
80·51	34·0	+8·9
84·57	34·3	+8·6
85·51	33·7	+8·2

32 and 38. The same small circular spot observed favourably three times in each of two rotations. The observations of 32 are

			At	Means.	
at 94·55	173·8	+17·8			
95·57	173·0	+18·2	95·88	173°·0	+18°·1
97·51	172·2	+18·3			

and of 38

121·57	167·4	+19·2			
123·54	167·3	+19·1	124·55	166·6	+19·3
128·55	165·1	+19·7			

Diurnal motions −13′ and +3′ . . . . for lat. +19°.

35. Observed twice only on April 21st and 24th.

Diurnal motions zero and zero . . . . for lat. −12°.

36. Observed twice on the same days as 35.

at 110·5	333·5	+8·4
113·5	333·7	+8·1

Diurnal motions +4′ and −6′ . . . . for lat. +8°.

44. Observed three times, as follows:

			Means.	
at 150·52	202·4	+11·4		
	197·8	+12·1	200·1	+11·7
151·51	204·3	+11·1		
	197·3	+12·5	200·8	+11·8
154·55	206·5	+11·5		
	196·5	+12·7	201·5	+12·1

Whence diurnal motions + 18′ and +6′ . . . . for lat. +12°.

50. Near the position of 44 in the next rotation. Observed as under

			At	Means.	
at 172·59	214·1	+10·8			
173·52	214·3	+10·4	173·55	214·1	+10·5
174·53	213·9	+10·2			
at 175·54	214·1	+10·4			
176·51	214·1	+10·4	176·52	214·2	+10·4
177·52	214·3	+10·4			
at 178·53	214·5	+10·3			
179·54	215·2	+10·1	179·54	215·0	+10·2
180·56	215·2	+10·2			

Diurnal motions +9′ and −3′ . . . . for lat. +10°.

51. Very favourably observed, as follows:

			At	Means.	
at 172·59	201·7	−14·5			
173·52	202·1	−14·7	173·55	201·9	−14·7
174·53	201·8	−14·9			

			At	Means.	
at 175·54	201·5	−14·9			
176·51	201·6	−14·7	176·52	201°·5	−14°·8
177·52	201·4	−14·7			
178·53	201·0	−14·9			
179·54	201·8	−14·4	179·54	201·1	−14·5
180·56	200·5	−14·2			
182·56	199·8	−13·7			

Diurnal motions −9′ and −3′ . . . . for lat. −15°.

55. All the indications of divergence and drift here exist, but the group changed too rapidly to admit of precise discussion of the positions recorded. Reference must be made to the figures.

57 and 59. If the influence of the dot which followed at some distance on July 29th and 30th may be disregarded, as I believe it may, there remain the following observed positions of the principal spot:

at 209·565	72·2	−11·7
210·518	72·5	−11·5
212·496	72·9	−11·2
213·553	72·6	−11·1
217·587	72·4	−10·9
218·517	72·5	−10·7
219·525	71·7	−10·4

and at the next rotation—

at 236·508	74·7	−10·2
237·535	74·1	−10·3
238·564	74·3	−10·1
239·528	74·4	−10·2
240·526	74·6	−10·4
241·522	74·6	−10·4
242·546	74·7	−10·3
243·517	74·8	−10·1

From the whole may be found

Diurnal motions +5′ and −2′ . . . . for lat. −11°.

58. A normal single spot observed as follows:

at 219·525	288·7	+6·5
221·504	288·8	+6·5
222·537	289·1	+6·4
224·525	289·3	+6·1
225·494	289·3	+6·1
227·574	289·3	+5·8

at 229·612 . .	289·3 . .	+5·8
230·470 . .	289·3 . .	+5·8
231·502 . .	290·0 . .	+5·8

Diurnal motions +4′ and −4′ . . . . for lat. +6°.

61. A single small dot seen twice only—

at 243·52 . .	353·7 . .	+6·0
246·52 . .	353·6 . .	+6·0

Diurnal motions zero and zero . . . . for lat. +6°.

but the dot may be the last of an unseen group.

62 and 67 may be the same group, but the want of further observations of 62 prevent discussion on this supposition with safety.

63. Occurs nearly in the position of 58 of the previous rotation, but the figures indicate that they are independent groups. The changes of 63 are too great to admit of useful comparison. Indeed, between Sep. 12th and 15th, a disappearance and fresh outbreak may have occurred.

64. Another group exhibiting the usual divergence, and

Diurnal motions of about +20′ and 0 . . . . for lat. −8°.

65. At the next rotation a dot 68 is found nearly in the same place, but without any than a chance coincidence with 65.

66. Observed as follows. A single normal spot.

at 268·544 . .	8·6 . .	+10·9
269·538 . .	8·5 . .	+10·4
270·559 . .	8·5 . .	+10·4
271·554 . .	8·6 . .	+10·2
272·562 . .	8·7 . .	+10·2
273·524 . .	8·7 . .	+10·2
274·512 . .	8·9 . .	+10·5

Diurnal motions +4′ and −4′ . . . . for lat. +10°.

69. A single medium spot, which underwent little change.

at 303·476 . .	283·5 . .	+7·8
304·512 . .	283·6 . .	+7·8
306·492 . .	283·9 . .	+8·1
309·520 . .	284·3 . .	+8·7
312·478 . .	284·7 . .	+9·1

Diurnal motions +8′ and +8′ . . . . for lat. +8°.

70, 74 and 77, appear to belong to the same group, but do not admit of numerical discussion.

71 and 75, are the same group, but the "following" portion of the group is so changed in the second rotation that no deduction of motion can be made.

Approximately the motions are $+15'$ and $+2'$ . . . . for lat. $-12°$.

72. Fully developed when first seen. The preceding portion undergoing considerable change.

73. The three first observations give—

at 326·462 . .	342·4 . .	+14·2
330·494 . .	343·0 . .	+14·0
332·505 . .	343·3 . .	+13·8

Whence diurnal motions $+9'$ and $-4'$ . . . . for lat. $+14°$.

79. An exceedingly large and fine confluent cluster, the "preceding" portion of which outlasts the rest, and comes round twice again, as 82 and 86. The two components of this group coalesced and did not diverge in the usual manner. From the loss of the "following" portion, I can only indicate that both diurnal motions are positive. The positions of 86 may bear comparison.

80. As follows. A dot, first observed very near the limb.

at 17·493 . .	302·0 . .	+8·1
20·567 . .	302·2 . .	+8·2
22·607 . .	303·1 . .	+7·7

Diurnal motions $+13'$ and $-4'$ . . . . for lat. $+8°$.

83 and 87. Different, though in the same place.

84 and 88. The same to be remarked, 88 not existing on March 29th, or previously. Neither admit of numerical discussion.

86. A small single spot observed as follows. See 79 and 82.

at 64·519 . .	39·5 . .	−9·1
65·490 . .	39·4 . .	−9·0
70·531 . .	39·4 . .	−9·3
71·528 . .	39·4 . .	−9·3
74·500 . .	40·1 . .	−9·1

Diurnal motions $+2'$ and $+1'$ . . . . for lat. $-9°$.

91. A dot observed twice on successive days.

at 108·622 . .	297·0 . .	+9·1
109·512 . .	297·2 . .	+9·0

Diurnal motions $+12'$ and $-6'$ . . . . for lat. $+9°$.

92. A large dot with insignificant companions.

at 115·506	114·7	−6·9
116·650	115·9	−6·6
117·507	116·8	−6·6

Diurnal motions +60′ and −9′ . . . . for lat. −7°.

93. A ring-formed cluster undergoing rapid change.

			Means.		Dist.
at 121·514	82·5	+ 8·1			
	78·1	+ 8·9	80·3	+8·5	4°
122·504	83·9	+ 7·1			
	77·1	+ 9·8	80·5	+8·5	8
124·510	85·5	+ 6·5			
	77·5	+10·6	81·5	+8·5	9

From which may approximately be inferred

Diurnal motions +27′ and zero . . . . for lat. +8°.

95. A double dot observed twice as follows:

at 121·514	28·1	+9·8
122·504	27·9	+9·3

Diurnal motions −12′ and −30′ . . . for lat. +10°.

96 and 97 probably belong to the same group.

The following positions of 97 may be compared

			Means.	
at 160·544	269·3	+5·2		
	264·8	+1·8	267·0	+3·5
161·517	270·4	+5·0		
	264·6	+2·6	267·5	+3·8

Also the following

164·575	270·0	+4·6		
	265·3	+5·0	267·7	+4·8
166·568	270·6	+4·3		
	264·8	+5·1	267·7	+4·7

On the whole diurnal motions +10′ and +4′ . . . . for lat. +4°.

99. May be treated as below.

			Means.		Dist.
at 215·587	283·5	+5·0			
	279·9	+4·8	281·7	+4·9	4·0
216·534	284·8	+5·5			
	280·4	+4·3	282·6	+4·9	4·8
217·645	285·6	+6·0			
	279·9	+4·8	282·8	+5·4	6·5
218·549	286·5	+6·1			
	279·6	+4·9	283·0	+5·5	7·0
219·548	286·5	+6·5			
	279·3	+5·2	282·9	+5·8	7·0

Whence diurnal motions +17′ and +17′ . . . . for lat. +5°.

102. Taking means of positions observed

at 274·5	240·6	−7·9	Dist.	2°·3
276·5	242·0	−8·6		6·6

Diurnal motions +36′ and +20′ . . . . for lat. −8°.

105. Again taking means of extreme points

at 289·542	35·5	−11·3	Dist.	2·1
292·585	36·3	−11·0		5·1

Diurnal motions +16′ and −6′ . . . . for lat. −11°.

107. A single normal spot favourably observed.

at 296·563	238·8	+8·0
299·541	239·7	+7·4
300·539	239·9	+7·1
304·506	240·4	+7·0

Diurnal motions +12′ and −8′ . . . . for lat. +8°.

113. A neat small round nuclear spot.

at 100·572	162·9	−11·3
106·458	164·0	−12·4
107·507	163·9	−12·3
108·509	164·1	−12·5
109·640	164·0	−12·3
110·532	163·8	−12·3

Comparing means of two first and four last observations.

Diurnal motions +5′ and +5′ . . . . for lat. −12°.

114. The third observation refers to part of this small group only. However inferring the mean positions to be

at 109·5	72·8	+5·8
110·5	73·9	+5·8
111·5	74·4	+5·8

Diurnal motions +48′ and zero . . . . for lat. +6°.

116. First outbreak at 30 degrees South, but too fragmentary for discussion.

117. A small double group of short duration.

			Means.		Dist.
at 154·514	243·9	+10·7			
	240·9	+10·5	242·4	+10·6	3°·0
155·513	245·7	+11·1			
	240·5	+10·3	243·1	+10·7	5·2
157·505	247·1	+11·1			
	240·1	+10·3	243·6	+10·7	7·0

Diurnal motions +24′ and +2′ . . . . for lat. +11°.

121. A small nuclear spot respecting which the figures should be consulted.

at 203·5	225·4	+7·2	(near the limb.)
204·5	225·0	+7·1	
205·6	225·2	+7·0	
206·5	224·8	+7·1	
207·5	225·0	+7·2	
209·6	225·2	+7·3	
210·5	225·5	+7·1	
211·5	225·3	+6·7	
212·5	224·8	+6·1	(much changed.)

Rejecting the first and last observation for reasons stated and grouping 2 to 5 and 6 to 8, we find

Diurnal motions +4′ and −1′ . . . . for lat. +7°.

123. A spot of which the following are a comparable series.

at 228·505	262·0	−8·0
229·599	262·8	−7·8
233·565	263·1	−7·7
234·507	263·2	−7·5
235·512	263·3	−7·4
238·513	264·1	−7·4

Diurnal motions +10′ and −4′ . . . . for lat. −8°.

124. A rather low South group which must be treated as follows, rejecting the observations of Aug. 30th and 31st.

			Means.	
at 244·58	90·8	−24·5		
	87·6	−24·6	89·2	−24·6
245·51	91·6	−24·8		
	86·9	−24·6	89·2	−24·7
246·51	92·0	−25·3		
	86·7	−24·5	89·3	−24·9
247·50	91·8	−25·2		
	86·3	−24·5	89·1	−24·9
248·51	91·7	−25·3		
	85·9	−24·5	88·8	−24·9
249·54	91·5	−25·6		
	86·7	−23·9	89·1	−24·8

Divergence very little after the two first days.

Diurnal motions − 5′ and +3′ . . . . for lat. −25°.

125. A high North group of small extent and duration.

			Means.	
at 254·52	319·4	+32·5		
	316·6	+32·0	318·0	+32·2
256·61	318·9	+31·8		
	315·4	+32.0	317·2	+31·9

257·51	318·6	+31·6		
	314·6	+32·4	316·6	+32·0

Diurnal motions −30′ and −2′ . . . . for lat. +32°.

128. A sharply defined dot. The first observation must be rejected as faulty in longitude, though I cannot trace any error. There remain

at 303·570	9·0	−27·5
305·535	9·2	−27·9
307·542	7·9	−27·9
308·511	7·5	−27·9

Diurnal motions − 24′ and +2′ . . . . for lat. −28°.

129. The changes shown in the figures are very characteristic, but too inconsecutive to admit of discussion of the motions.

130. Too near the limb for comparison.

132. A neat round nuclear spot observed four times.

at 331·5	354·6	−35·4
333·5	355·3	−35·6
334·5	354·2	−35·8
335·5	353·6	−35·9

Diurnal motions −50′ and +6′ . . . . for lat. −36°.

133. Exhibiting changes interesting to compare, but not expressible in numbers.

134. The diagrams contain the first traces of the group, and show the rapid development and divergence of the first two days.

at 0·478	—	—	271·3	−23·2
1·492	273·0	−21·9		
	267·1	−24·5	270·1	−23·1
2·501	274·5	−22·2		
	265·8	−25·2	270·2	−23·7
4·538	274·4	−22·3		
	...	...	...	...

The conclusions are too precarious to set down.

135. A double group observed three times.

			Means.	
at 9·560	209·9	+31·2		
	202·7	+31·2	206·3	+31·2
11·456	210·4	+30·5		
	200·4	+31·9	205·4	+31·2
13·503	209·4	+30·4		
	198·8	+31·5	204·1	+31·0

Whence diurnal motions −33′ and −3′ . . . . for lat. +31°.

137. First observation too near the limb. The others give for the central point (see figures)

at 15·5	67·1	+3·0
16·6	67·0	+3·8
18·6	67·6	+4·5
20·5	67·8	+4·7

Diurnal motions +13′ and +24′ . . . . for lat. +4°.

138. A single dot, accurately observed four times.

at 22·538	316·2	−29·3
23·649	316·5	−28·8
27·481	314·6	−29·5
28·476	314·0	−29·7

Diurnal motions −24′ and +7′ . . . . for lat. −29°.

139. Two fine spots, from 10 to 12 degrees distant, which exhibited a rapid motion in common to the two.

			Means.		Dist.
					°
at 34·468	159·4	−31·3			
	151·8	−36·1	155·6	−33·7	9·2
36·492	159·8	−31·5			
	149·5	−36·1	154·7	−33·8	11·5
39·416	158·9	−32·0			
	147·7	−36·3	153·3	−34·2	12·0
41·489	155·7	−32·0			
	145·1	−36·1	150·4	−34·1	11·5
42·505	154·7	−32·0			
	144·4	−36·2	149·6	−34·1	11·5
43·474	154·1	−32·2			
	143·7	−36·3	148·9	−34·3	11·5

Diurnal motions −44′ and +3′ . . . . for lat. −34°.

140. A sharp dot well observed four times.

at 42·505	56·6	−28·0
45·515	56·4	−27·8
46·507	56·4	−27·9
47·581	56·1	−27·9

Diurnal motions −5′ and −1′ . . . . for lat. −28°.

141. A small group which existed only two days.

			Means.	
at 63·550	212·0	−24·3		
	209·2	−24·3	210·6	−24·3
64·582	212·8	−24·2		
	208·1	−24·4	210·4	−24·3

Diurnal motions −10′ and zero . . . . for lat. −24°.

142. A dot, which became nucleus of a penumbral spot and again on the fourth day a dot. See figures.

at 73·5	22·3	−29·8
74·5	22·9	−29·7
75·5	23·2	−30·1
76·5	22·9	−30·3

Diurnal motions +14′ and +14′ . . . . for lat. −30°.

I suspect that on the first two days there was a sensible motion of divergence towards greater longitude, which vitiates the conclusion in this instance.

143. A well defined dot seen twice only.

at 89·633	263·2	+28·0
90·570	263·1	+28·4

Diurnal motions −4′ and +24′ . . . . for lat. +28°.

144. We must be guided in the treatment by the figures. Taking means of extreme portions,

			Means.	
at 95·5	136·5	−27·7		
	126·3	−30·3	131·4	−29·0
96·6	136·9	−27·2		
	125·5	−29·7	131·2	−28·5
98·6	136·5	−27·0		
	123·4	−29·8	130·0	−28·4
99·5	136·2	−26·7		
	122·8	−30·5	129·5	−28·6
101·6	135·6	−27·2		
	121·0	−30·6	128·3	−28·9

Diurnal motions −30′ and 0 . . . . for lat. −29°.

146, 157 and 161. Supposed to be the same, and entirely independent of 144 of the previous rotation. In which case an instance of one component lasting to the third rotation after the other has disappeared. Observations of the first rotation—

at 121·483	122·2	−21·4	
122·583	122·2	−21·5	
124·590	121·7	−21·8	
125·487	121·6	−21·7	
126·623	121·6	−21·7	
128·623	121·2	−21·8	
130·483	120·2*	−21·9	(near the limb.)

Observations of the second rotation

at 145·519	119·7*	−21·7	(near the limb.)
146·504	119·3	−21·4	
147·544	119·1	−21·4	

149·511 . .	118·9 . .	−21·5	
151·500 . .	118·3 . .	−21·8	
152·672 . .	117·6 . .	−21·9	
153·580 . .	117·7 . .	−21·8	
154·505 . .	117·1 . .	−21·8	
155·507 . .	116·7 . .	−21·6	
157·658 . .	115·1* . .	−21·2	(near the limb.)

Observations of the third rotation

at 173·518 . .	114·1* . .	−21·3	(near the limb.)
174·528 . .	112·9 . .	−21·5	
175·529 . .	112·5 . .	−21·9	
176·421 . .	112·1 . .	−21·9	
177·645 . .	110·9 . .	−22·1	
178·512 . .	110·5 . .	−22·1	
179·667 . .	110·1 . .	−22·3	

On the fourth rotation of this portion of the Sun no remains of this spot are found, but on the fifth there are two new small nuclear spots (172). Reducing each series to one position at each rotation

at 125·5 . .	121·7 . .	−21·7
151·5 . .	118·1 . .	−21·7
177·5 . .	111·2 . .	−22·1

From the first and second there result

Diurnal motions −8′ and 0′ . . . . for lat. −22°.

From the second and third

Diurnal motions −14′ and +1′ . . . . for lat. −22°.

conclusions of considerable weight.

147 and 158. Unusually slow in developing. At its second appearance the indications of drift are very remarkable. The following may be compared.

			Means.	
at 132·463 . .	30·7 . .	−26·2		
	24·4 . .	−27·0 . .	27·6 . .	−26·6
135·511 . .	30·7 . .	−26·8		
	20·6 . .	−29·1 . .	25·7 . .	−28·0
136·525 . .	31·9 . .	−26·8		
	19·4 . .	−29·0 . .	25·7 . .	−27·9

Whence diurnal motions about −30′ and +10′ . . . . for lat. −28°.

In the second rotation we must infer from the figures

at 154·5 . .	18·5 . .	−28·2
158·5 . .	14·3 . .	−29·0

and diurnal motions −60′ and +12′ . . . . for lat. −28°.

150. A moderate double group, fully developed on the second day. Divergence not very marked.

			Means.	
at 137·525	313·5	−23·1		
	310·9	−21·8	312·2	−22·4
138·593	313·4	−23·4		
	309·3	−23·2	311·4	−23·3
139·504	313·4	−23·6		
	308·9	−23·5	311·2	−23·6

Diurnal motions −30′ and +18′ . . . . for lat. −23°.

152. A very interesting series for inspection. Perhaps the motions may be inferred from the following,

			Means.	
at 135·511	290·9	+22·3		
	285·0	+20·6	288·0	+21·5
137·525	293·4	+22·3		
	282·5	+20·2	288·0	+21·3
139·504	293·5	+22·5		
	283·5*	+21·3*	288·5	+21·9

Motions uncertain: probably positive for both elements.

154 and 160. Imperfectly observed. Probably different.

155. Nearly on the Equator. Unfortunately seen but once.

159. Similar dots, but new ones, here next rotation.

162 and 168. I take the nucleus which lasts through.

			Means.	
at 186·474	60·2	+23·9		
187·531	59·9	+23·7	59·9	+23·8
188·587	59·5	+23·9		
205·622	57·1	+23·8		
206·622	56·9	+24·0	57·0	+23·9

Diurnal motions −10′ and zero . . . . for lat. +24°.

165. A group of large dots near the Equator.

			Means.		Dist.
at 188·587	307·5	+3·4			
	301·5	+2·7	304·5	+3·1	6°0
189·493	309·1	+3·1			
	301·7	+2·8	305·4	+2·9	7·5
191·494	311·2	+2·6			
	301·6	+2·8	306·4	+2·7	9·7
192·503	312·0	+2·2			
	301·9	+3·5	307·0	+2·8	10·2

193·495	313·2	+2·2				
	303·2	+3·8	308·2	+3·0	10·2	

Diurnal motions +38′ and −2′ . . . . for lat. +3°.

The change of position of the line joining the two extreme points observed deserves notice in this instance as well as the ordinary divergence.

166. A well defined dot.

at 193·5	218·9	−22·4
194·5	218·2	−22·3

Diurnal motions −42′ and −6′ . . . . for lat. −22°.

The conclusion is of little weight, the observations being made near the limb on consecutive days.

167 and 171. These are probably different. The only part of 167 which would correspond in longitude to 171 the next rotation was vanishing when last previously observed, and the latitudes would not be reconcilable. The unbroken series of sketches of 167 shows better than usual what might be obtained in a finer climate. The first trace and nearly the whole history of the group are recorded. No satisfactory discussion for diurnal motions is however possible.

168. A well defined small spot seen twice only.

at 205·6	57·1	+23·8
206·6	56·9	+24·0

Diurnal motions −12′ and +12′ . . . . for lat. +24°.

Of little weight for the same reason as for 166.

170. An excellent series of a normal spot.

at 223·660	189·9	−20·2
224·561	189·8	−20·3
225·581	189·2	−20·6
227·492	188·5	−20·5
228·449	188·6	−20·7
229·489	188·4	−20·6
230·528	187·9	−20·4

Diurnal motions −16′ and +3′ . . . . for lat. −20°.

171. Another good series of a normal spot.

at 223·660	187·7	+27·5
224·561	187·1	+27·5
225·581	186·5	+27·7
227·492	185·9	+28·3
228·449	185·4	+28·4
229·489	185·1	+28·5
230·528	184·4	+28·4

Diurnal motions −25′ and +10′ . . . . for lat. +28°.

173. A still better series wanting only one day.

at 233·501	39·2	−29·0
234·503	39·5	−28·6
235·461	38·7	−28·5
236·526	38·0	−28·7
237·511	37·6	−28·9
238·551	37·6	−29·1
239·510	36·5	−29·1
241·496	35·2	−28·6
242·500	34·4	−28·3
243·514	33·7	−28·0
244·565	33·1	−27·8

Diurnal motions −38′ and −6′ . . . . for lat. −29°.

174 and 184. I should not hesitate to identify these groups as the same, but that on Aug. 31st, 174 was manifestly tending to extinction, and on Sept. 1st and 2nd, the Sun was observed and no group recorded in the position of 174. 184 came on on Sept. 20th, as 174 was last seen on Aug. 31st, having two simple centres at the same relative positions, and affected by a common motion in longitude. The coincidence is peculiar, and looks like evidence of the revival of a group after an interval of several days.

For 174 we have the following observations,

			Means.	
at 236·5	27·4	+19·8		
	23·5*	+20·4*	25·4	+20·1
237·5	28·6	+19·5		
	23·2*	+20·5*	25·9	+20·0
238·5	29·1	+19·9		
	23·2	+20·8	26·2	+20·3
239·5	28·6	+19·8		
	22·6	+21·9	25·6	+20·8
241·5	28·8	+19·5		
	22·2*	+21·5*	25·5	+20·5
242·5	28·7	+19·5		
	21·8	+21·1	25·3	+20·3

Whence diurnal motions −6′ and +1′ . . . . for lat. +20°.

For 184 the following positions were obtained:

at 262·5	25·1	+19·7		
	18·2	+21·3	21·7	+20·5
263·5	24·8	+19·2		
	18·2	+21·3	21·5	+20·3
265·5	25·2	+19·1		
	17·6	+21·8	21·4	+20·5

266·5	. .	25·4	. .	+19·0		
		17·6	. .	+22·0	. . 21·5	. . +20·5

Diurnal motions −4′ and 0 . . . . . . for lat. +20°.

It may be well to repeat that in the record of Sept. 1st, 1857, it was expressly noted that 174 was gone.

176. Two spots of short duration.

					Means.	
at 247·5	. .	304·4	. .	+29·2		
		298·1	. .	+28·4	. . 301·3	. . +28·8
248·6	. .	304·2	. .	+29·6		
		297·8	. .	+28·5	. . 301·0	. . +29·0
249·5	. .	304·0	. .	+29·5		
		...		...	...	...

Diurnal motions −18′ and +10′. . . . for lat. +29°.

177. Observed twice. Gone on the 6th Sept. 185 is near here.

at 244·5	. .	264·3	. .	−17·2
247·5	. .	263·7	. .	−17·1

Diurnal motions −12′ and −2′ . . . . for lat. −17°.

178. Several small dots.

					Means.	
at 248·6	. .	232·2	. .	−20·2		
		228·6	. .	−19·8	. . 230·4	. . −20·0
249·5	. .	233·8	. .	−20·2		
		228·4	. .	−19·4	. . 231·1	. . −19·8
252·5	. .	234·6	. .	−20·0		
		228·6	. .	−19·8	. . 231·6	. . −19·9

Diurnal motions +15′ and zero . . . . for lat. −20°.

179 and 187. No numerical discussion of 179 is practicable. On Sept. 14th, it is recorded as dying away; and on the next day an outbreak is noted, which has the appearance of a new group overlying part of the old one. Of 187 the following positions are found

at 274·5	. .	211·5*	. .	+19·0 near the limb.
277·5	. .	209·6	. .	+19·0
278·5	. .	209·3	. .	+19·0
282·5	. .	208·8	. .	+18·8
285·5	. .	207·8	. .	+19·3
286·5	. .	207·8	. .	+19·5

Diurnal motions −12′ and +3′ . . . . for lat. +19°.

180. A neat circular spot favourably observed. 190, which is near the same place, is different.

at 252·5	. .	176·2	. .	−26·5
255·5	. .	174·3	. .	−26·9
256·5	. .	173·5	. .	−26·5
258·5	. .	172·4	. .	−26·6

259·5	171·7	−26·7
260·4	170·8	−26·7

Diurnal motions −40′ and zero . . . . for lat. −27°.

181 and 189. The components extend over 20 degrees. For 181, while double, we have

			Means.	
at 252·451	177·0	+23·2		
	167·3	+22·2	172·2	+22·7
255·520	178·8	+22·4		
	165·0	+24·0	171·9	+23·2
256·668	178·6	+22·7		
	163·8	+24·5	171·2	+23·6
258·496	178·2	+22·9		
	162·5	+24·5	170·4	+23·7
259·489	178·0	+22·8		
	162·5	+24·8	170·3	+23·8
260·413	177·3	+22·7		
	162·3	+24·9	169·8	+23·8

Diurnal motions −20′ and +10′ . . . . for lat. +23°.

For the two rotations I compare the following :

at 260·4	177·3	+22·7	176·2	+22·4
262·5	175·2	+22·2		
277·5	173·6	+21·5	172·1	+21·2
278·5	173·7	+21·3		
282·5	172·2	+21·0		
285·5	170·6	+21·0		
286·5	170·3	+21·3		

Whence diurnal motions −12′ and −3′ . . . . for lat. +22°.

182 is different from 192 and 201, inasmuch as on Sept. 23d it was no longer visible. This spot shows fully the process of one round nuclear spot breaking up into two. See 224 for another instance, also 219 and 290. I treat 182 as follows,

at 255·520	——	——	118·5	−17·8
256·668	——	——	118·2	−17·6
258·496	120·0	−16·9		
	117·5	−18·1	118·8	−17·5
259·489	120·2	−17·1		
	117·4	−17·8	118·8	−17·5
260·413	120·7	−16·9		
	117·3	−17·5	119·0	−17·2

After this the changes are too great.

Diurnal motions +10′ and −5′ . . for lat. −17°.

183 and 194. Groups 204 and 211 are distinct, 194 having disappeared on Oct. 27th. The divergence of 183 during the first 7 days is extraordinary, and the instance is favourable for noticing that the separation takes place in the line joining the two spots, and is not merely a difference of motion in longitude. One spot here moves North and the other South very plainly.

			Means.		Dist.
at 266·489	36·6	+23·8			
	34·0	+24·6	35·3	+24·2	2·6
268·471	39·2	+23·6			
	30·6	+26·2	34·9	+24·9	9·0
271·458	42·7	+22·5			
	28·9	+26·9	35·8	+24·7	15·0
272·472	42·5	+22·3			
	27·6	+27·3	35·1	+24·8	16·0

I do not think any conclusion of diurnal motion would be of value. For 194 we have the following :

at 288·507	47·3	+25·6
289·499	46·8	+25·8
291·594	46·0	+25·9
292·568	46·2	+26·0
295·546	46·1	+26·2
296·482	46·0	+26·5
298·465	45·5	+26·8

taken alone these positions indicate

Diurnal motions $-7'$ and $+7'$ . . . . for lat. $+26°$.

192 and 201. Of 192 most may be learnt from the figures. The observations of 201 are

at 311·564	129·4	−18·9
312·456	129·4	−18·9
314·476	128·5	−18·5
318·490	127·8	−18·5

Diurnal motions $-16'$ and $-5'$ . . . . for lat. $-19°$.

193 and 203 must be different, for 193 is recorded gone on Oct. 24, and yet how similar in every respect. Of the former we find

at 291·594	56·7	−23·0
292·568	56·6	−23·4
295·546	55·8	−23·0

Diurnal motions $-14'$ and $-3'$ . . . . for lat. $-23°$.

Of 203 we have

			Means.	
at 318·5	54·9	−23·5		
	50·7	−23·1	52·8	−23·3

321·5	56·9	−22·4		
	48·6	−23·5	52·8	−23·0
322·6	57·6	−22·6		
	49·0*	−23·0	53·3	−22·8

The position of the mean is rendered uncertain by the degradation of one of the component spots.

195. Very near the Equator, but seen only on two days.

197. May be the commencement of 207, but uncertain.

198. Too rapidly changed for comparison of parts.

199. The principal spot subdivides into three, which on November 1st, 1857, appear in contact. The interruption of the record by weather is to be regretted.

at 299·5	244·0	+22·0
300·5	242·9	+21·9
302·5	242·0	+21·3
304·6	240·5	+21·3

Diurnal motions −38′ and −12′ . . . . for lat. +22°.

200. Seems to admit only of the remark that the extent in longitude on November 1st was more than 30 degrees, if the two nuclei seen only on that day belong to the same group as the rest.

203. See 193. Compare also 210.

204. See 183. Compare also 211.

207. A normal spot (see 197) observed as follows:

at 322·6	311·2	−16·3
325·6	311·1	−17·0
328·5	310·9	−17·0
330·5	310·4	−16·9
331·5	310·2	−17·0

Diurnal motions −10′ and zero . . . . for lat. −17°.

208. A neat normal spot.

at 337·5	159·9	−17·1
338·5	159·9	−16·7
341·5	159·6	−16·7

Diurnal motions −5′ and −3′ . . . . for lat. −17°.

209. Another very similar to the last.

at 337·5	. .	149·8	. .	+29·5	
338·5	. .	149·3	. .	+29·8	
341·5	. .	147·8	. .	+29·8	

Diurnal motions −30′ and +3′ . . . . for lat. +30°.

210. Very imperfectly observed through bad weather. I think the dots in longitude 62° in the next rotation are the remains of this group and do not belong strictly to 220.

213, 214, etc. to 217. Bad weather has rendered the observations too inconsecutive for discussion.

218. A dot follows which renders results precarious.

at 8·635	. .	111·4	. .	+ 6·3
10·551	. .	111·4	. .	+ 7·4

Diurnal motions zero and +30′ . . . for lat. +7° (?)

219. The diagrams for January 4th, 9th, 11th and 12th, which should be referred to indicate

Diurnal motions zero and zero . . . . for lat. −8°.

220 and 229. The first of these should have received two numbers, as there can be little doubt of there being two groups with the remains of 210 between them on January 9th. The portion B which was first seen on that day admits only of inspection. The principal spot of group A recurs in 229, and the figures show that it may be treated as follows:

First rotation.

at 3·5	. .	84·0	. .	−27·6
8·6	. .	81·8	. .	−28·2
10·6	. .	80·5	. .	−28·3
11·5	. .	79·9	. .	−28·5
12·5	. .	79·8	. .	−28·8
13·5	. .	78·4	. .	−28·9

Second rotation.

30·5	. .	68·3	. .	−29·7
31·5	. .	68·1	. .	−29·4
35·5	. .	65·3	. .	−28·7
38·6	. .	63·7	. .	−28·6
39·6	. .	63·3	. .	−28·8

The drift may best be obtained from the following means:

at 11·5	. .	80·1	. .	−28·5
35·5	. .	65·6	. .	−29·0

Whence diurnal motions −36′ and +1′ . . . . for lat. −29°.

Group 239 appears to be another outbreak in the same region, distinct from the foregoing.

224. One of the best series obtained and highly interesting as an instance of the separation of one spot into two detached ones. For motion take observations

at 18·5	——	——	225·9	+33·6
20·5	——	——	225·1	+33·5
. . . . .				
at 26·5	221·8	+33·3		
	219·3	+34·3	220·6	+33·8
27·5	221·2	+33·5		
	218·4	+34·7	219·8	+34·1

Diurnal motions—42′ and +3′ . . . . for lat. +34°.

226. The divergence is very marked, but this group attains no development.

230. A well marked dot, seen twice only.

at 48·573	231·2	+20·3
49·647	231·7	+20·3

Diurnal motions +24′ and zero . . . . for lat. +20°.

231. Observed as follows:

at 48·6	223·7	−21·3		
	217·7	−23·1	220·7	−22·2
49·6	223·6	−20·9		
	217·3	−23·5	220·5	−22·2
52·6	225·0	−20·4		
	216·0	−23·9	220·5	−22·2

Diurnal motions zero and zero . . . . for lat. −22°.

233. A normal spot, not very favourably observed.

at 49·647	171·6	−28·8
52·558	169·2	−28·4
58·560	164·1	−29·6

Diurnal motions −50′ and +8′ . . . . for lat. −29°.

235. Does not admit of numerical discussion.

236. Two dots only. High north.

at 64·6	92·7	+36·4		
	88·9	+37·6	90·8	+37·0
65·6	92·2	+35·6		
	86·7	+37·4	89·5	+36·5

Diurnal motions −78′ and −30′ . . . . for lat. +37°.

238. The three observations of the nuclear spot show no motion, but I have no confidence in this result, as there are indications of this spot being only a portion of a group.

239. It would be difficult to justify any particular course of treatment. I therefore omit numerical discussion, and refer the reader to the figures.

241. There being no remarkable divergence, I treat the principal nuclear spot alone as follows:

at 62·5	. . 21·2	. . +26·2
64·6	. . 21·2	. . +26·4
65·6	. . 20·8	. . +26·1
66·6	. . 20·4	. . +25·8
68·5	. . 19·5	. . +26·0
69·5	. . 18·7	. . +25·9
70·5	. . 17·7	. . +25·8

Whence diurnal motions −31′ and −2′ . . . . for lat. +26°.

242. A dot observed only twice.

at 64·611	. . 9·9*	. . −19·8
65·646	. . 10·8	. . −19·6

* On referring to the original, I find that the observation of March 6th is not reliable, as snow was falling, and there were 16 different points on the disk to be observed. Single contacts only were procured.

244 and perhaps 253. One of the largest groups recorded. Seen generally with the naked eye. The portion of 244 in longitude 290° may have come on again as 253, but this is very uncertain. For so large a group, the duration is short. Not susceptible of numerical discussion.

245. A double dot. Seen twice only.

at 73·480	. . 265·5	. . +28·9
74·590	. . 264·7	. . +28·9

Diurnal motions −42′ and zero . . . . for lat. +29°.

246. See the figures. Comparing those of March 21st and 22nd there will be seen an instance of one spot losing its penumbra, and of another having penumbra on the 22nd which had none on the 21st. The nuclear spot recorded on the 26th appears to be a new outbreak. I can base no numerical result on the data procured.

247. Perhaps the portion which was situated in longitude 210° might be treated separately from that in longitude 200°, but the inferences would be questionable. 259 of the next rotation appears to be distinct.

248. A well marked dot observed as follows:

at 78·5	. . 194·4	. . +14·2
79·5	. . 194·3	. . +13·9

80·5	194·4	+14·0
81·5	193·7	+14·0

Diurnal motions −9′ and zero . . . . for lat. +14°.

249. I compare the following:

			Means.	
at 78·5	196·7	−31·8		
	189·7	−33·9	193·2	−32·8
79·5	195·7	−31·7		
	189·3	−33·7	192·5	−32·7
80·5	196·9	−31·6		
	187·7	−33·8	192·3	−32·7
81·5	196·1	−31·6		
	185·7	−34·6	190·9	−32·1

Diurnal motions −36′ and −10′ . . . . for lat. −33°.

250. A very similar group (260) but quite distinct is here the next rotation.

			Means.	
at 84·5	145·7	−18·0		
	138·9	−17·4	142·3	−17·7
85·6	146·8	−17·7		
	138·3	−17·7	142·5	−17·7
86·6	147·9	−17·3		
	137·3	−17·4	142·6	−17·3
87·5	148·5	−17·3		
	...	...	...	...

Diurnal motions +9′ and −12′ . . . . for lat. −18°.

253. See 244. Not susceptible of discussion.

254. A small normal spot of short duration.

at 100·5	279·3	+24·2
101·5	278·7	+24·0

Diurnal motions −36′ and −12′ . . . . for lat. +24°.

257. An insignificant group.

			Means.	
at 108·5	228·8	−21·1		
	226·1	−23·1	227·4	−22·1
109·6	230·1	−21·2		
	224·9	−23·6	227·5	−22·4
110·5	231·0	−21·2		
	...	...	...	...

Diurnal motions +6′ and +18′ . . . . for lat. −22°.

258. Two or three small groups of dots. See the figures. Nothing can be made of them.

260. New on April 19th (see 250).

			Means.	
at 109·6	142·7	−18·7		
	139·3*	−20·9*	141·0	−19·8
110·5	143·8	−18·5		
	139·0*	−21·3	141·4	−19·9
111·5	144·2	−18·3		
	138·3	−21·8	141·3	−20·0
113·5	145·6	−18·1		
	137·5	−22·0	141·5	−20·1

Diurnal motions +6′ and +4′ . . . . for lat. −20°.

261. The principal spot of 269 is probably the same as the principal nucleus of 261 on April 28th. The mean positions of 261 will be nearly as follows:

at 111·5	84·6*	−20·0*
113·5	84·6*	−20·0*
114·5	84·9*	−20·0*
115·5	85·0*	−20·0*
117·5	85·2*	−20·0*

from which a small positive motion in longitude would follow: while for 269 we have

at 140·6	73·1	−22·2
142·5	72·6	−22·2
145·6	71·6	−22·1
148·5	71·2	−22·6
149·5	71·0	−22·6

Whence diurnal motions −14′ and +3′ . . . . for lat. −22°.

Both results must be taken for what they are worth with others. The divergence of 261 is remarkable.

262. Appears to be two separate groups, the portion between longitudes 15 and 35 appearing again as 272. Discussion is quite impossible.

264. The following points are comparable.

			Means.	
at 122·5	360·5	+26·8		
	353·9	+28·2	357·2	+27·5
124·5	359·6	+27·2		
	352·5	+28·5	356·1	+27·8
126·6	358·6	+27·6		
	351·4	+28·1	355·0	+27·9

Diurnal motions −33′ and +6′ . . . . for lat. +28°.

267. I suspect this is the latter portion of a group not seen. See 259 of the previous rotation.

at 129·5	. . 203·2	. . −20·1
132·5	. . 204·6	. . −19·5
135·6	. . 205·3	. . −19·4
137·6	. . 205·2	. . −19·4

Diurnal motions +15′ and −4′ . . . . for lat. −20°.

268. On the 26th a new outbreak occurs. The previous observations are four:

			Means.	
at 137·6	. . 122·8	. . −12·4		
	120·0	. . −11·6	. . 121·4	. . −12·0
138·6	. . 123·6	. . −12·4		
	119·3	. . −10·9	. . 121·4	. . −11·7
140·6	. . 124·6	. . −12·2		
	119·8	. . −11·5	. . 122·2	. . −11·9
142·5	. . 125·9	. . −11·3		
	120·1	. . −10·9	. . 123·0	. . −11·1

Whence diurnal motions +20′ and −6′ . . . . for lat. −12°.

The last observation of a new circular spot

at 145·572 . . 128·6 . . −8·2

may be the same as 281 next rotation, but not certainly.

270. Dots which change. The following are comparable.

at 148·5	. . 45·7	. . −21·9
149·5	. . 45·8	. . −21·8

Diurnal motions +6′ and −6′ . . . . for lat. −22°.

271. A succession of at least 5 different outbreaks occurs in the region occupied by this group. See 285, 299, 310 and 328. Not susceptible of numerical discussion.

272. See the figures. Refer also to 262.

273. See 287 and 289, with neither of which, however, it is identical. Both are fresh in the same part.

275. The first trace of this large group was recorded on May 31st, when there were only 6 small dots. The quantity of penumbra on most days is unusually great. The motion in longitude is evidently positive, but the observations cannot be treated in any exact manner. 291 may be the remainder of this group next rotation.

278. Two groups under this number.

A.	at 156·5	208·7	+16·2	
	157·5	208·4	+16·2	
	158·5	208·8	+16·1	
	159·5	208·8	+15·8	

Whence diurnal motions +8′ and −8′ . . . . for lat. +16°.

B. A new group of which the divergence is noticeable.

			Means.	
at 164·5	196·0*	+13·4*		
	192·2	+13·0	194·1	+13·2
165·5	197·4	+13·9		
	191·6	+12·9	194·5	+13·4
166·5	199·2	+14·3		
	190·8	+13·1	195·0	+13·7

Whence diurnal motions +27′ and +15′ . . . . for lat. +13°.

281. A normal circular spot. See 268 and 297.

at 162·508	137·2	−9·8
163·515	137·3	−9·5
164·517	137·1	−9·5
165·519	137·1	−9·3
166·527	137·2	−9·0
169·528	137·7	−8·8
171·566	137·3	−8·9
172·535	137·2	−8·9

Diurnal motions +1′ and −4′ . . . for lat. −9°.

which induces me to regard 297 as distinct.

282. A small spot of very short duration.

at 171·566	119·1	−20·5
172·535	118·6	−20·7

Diurnal motions −30′ and +12′ . . . . for lat. −21°.

284. The figures indicate the whole of this spot's brief history.

			Means.	
at 175·666	43·9	−23·1		
	41·8	−24·9	42·9	−24·0
176·547	43·9	−22·8		
	41·6	−24·9	42·7	−23·9
177·617	43·7	−22·7		
	40·6	−24·9	42·2	−23·8

Whence diurnal motions −21′ and −6′ . . . . for lat. −24°.

285. The second outbreak in this part. See 271.

			Means.	
at 169·5	39·4	+18·7		
	32·4	+21·5	35·9	+20·1

171·6 . .	40·1 . .	+18·3		
	30·3 . .	+20·7 . .	35·2 . .	+19·5
172·5 . .	40·2 . .	+18·4		
	29·8 . .	+20·5 . .	35·0 . .	+19·5
173·5 . .	40·3 . .	+18·4		
	29·0 . .	+20·6 . .	35·1 . .	+19·5

Diurnal motions $-12'$ and $-7'$ . . . . for lat. $+20^{\circ}$.

287 and 289. Compare 273 of the rotation before, and 300 of the next. All different.

290. The lowest South spot observed by me, and I know of none other so low in the record of any other observer. The spot divides into two quite detached at once.

			Means.	
at 181·663 . .	318·0 . .	−45·0		
	315·4 . .	−44·8 . .	316·7 . .	−44·9
182·678 . .	317·1 . .	−44·2		
	313·9 . .	−44·8 . .	315·5 . .	−44·5
184·527 . .	314·6 . .	−44·0		
	310·2 . .	−44·9 . .	312·4 . .	−44·4

Whence diurnal motions $-92'$ and $-8'$ . . . for lat. -45°.

291. A neat circular spot. See 275, with which it may be connected.

at 176·5 . .	301·9* . .	−13·7	(near the limb.)
177·6 . .	300·7 . .	−13·8	
179·5 . .	300·4 . .	−14·2	
180·6 . .	300·5 . .	−14·2	
181·7 . .	300·1 . .	−14·2	
182·7 . .	300·2 . .	−14·1	
184·5 . .	300·3 . .	−13·8	
186·5 . .	299·8 . .	−14·0	

Diurnal motions $-4'$ and $-1'$ . . . for lat. -14°.

292. May be treated as three detached spots. I extract the following only for comparison. A normal spot.

at 177·6 . .	280·9 . .	−22·0
179·5 . .	278·5 . .	−22·1
180·6 . .	278·1 . .	−21·9
181·7 . .	277·2 . .	−21·9
182·7 . .	276·8 . .	−21·8
184·5 . .	277·0 . .	−21·7
186·5 . .	277·3 . .	−21·4
188·6 . .	276·2 . .	−21·3

Whence diurnal motions $-15'$ and $-4'$ . . . . for lat. -22°.

293. Two groups under this number.

A. A small circular spot seen till July 6th.

at 181·663 . .	247·4 . .	−12·3
182·678 . .	247·4 . .	−12·6
184·527 . .	247·4 . .	−12·3
186·487 . .	247·1 . .	−12·1

Diurnal motions −3′ and −4′ . . . . for lat. −12°.

B. Commences as a dot on July 2nd and becomes a largish group, one component of which reappears as 304 and 316. First 293 B as follows:

			Means.	
at 184·527 . .	245·3 . .	−20·4		
	239·2 . .	−20·2 . .	242·3 . .	−20·3
186·487 . .	246·7 . .	−20·5		
	238·3 . .	−20·0 . .	242·5 . .	−20·3
188·651 . .	246·7 . .	−21·0		
	237·5 . .	−22·1 . .	242·1 . .	−21·5

Diurnal motions −3′ and +18′ . . . . for lat. −21°.

Next for the nucleus which recurs.

First rotation

at 188·6 . .	246·7 . .	−21·0
191·5 . .	246·4 . .	−21·3

Second rotation

at 212·5 . .	246·2 . .	−21·3
215·5 . .	245·6 . .	−21·5
218·5 . .	243·6 . .	−21·4

Third rotation

237·6 . .	239·6 . .	−21·8

The motion increases as the original divergence becomes less influential, and we may conclude

Diurnal motions −15′ and +1′ . . . . for lat. −21°.

295. The group 306 in this region next rotation is quite distinct as the figures conclusively show. Of 295 the large spot on the parallel −21° alone admits of useful discussion.

at 184·5 . .	191·7 . .	−20·9
186·5 . .	190·5 . .	−20·6
188·6 . .	189·8 . .	−20·8
191·5 . .	188·7 . .	−21·4
192·5 . .	188·3 . .	−21·6
194·5 . .	187·8 . .	−21·7
195·5 . .	187·2 . .	−21·6

Whence diurnal motions −23′ and +7′ . . . . for lat. −21°.

296. A normal circular spot.

at 188·6 . .	154·2* . .	−19·6
191·5 . .	155·8 . .	−19·5

192·5	. . 155·0 . .	−19·6
194·5	. . 154·0 . .	−19·7
195·5	. . 153·8 . .	−19·9
197·5	. . 153·6 . .	−20·1

The first of these longitudes is either in error some 3 degrees, or the spot is a component still retaining motion of divergence in a group which has disappeared.

Diurnal motions −24′ and 4′ . . . . for lat. −20°.

297. Two groups. Compare the spot in −10° with 281.

A.	at 188·6	. . 140·6 . .	− 9·9
	191·5	. . 140·3 . .	− 9·7
	192·5	. . 140·4 . .	− 9·9
	194·5	. . 140·7 . .	− 9·8
	195·5	. . 140·6 . .	−10·0
	197·5	. . 140·8 . .	− 9·8

Whence diurnal motions +4′ and zero . . . . for lat. −10°.

B. Hardly sufficiently observed.

			Means.	
at 191·5	. . 131·5	. . −15·5		
	127·0	. . −16·1	. . 129·2	. . −15·8
192·5	. . 132·4	. . −15·8		
	127·1	. . −16·6	. . 129·7	. . −16·2

Diurnal motions +30′ and +24′ . . . . for lat. −16°.

From this date the observations are less continuous from unavoidable causes.

299. The third outbreak in this place. See 271, 285 preceding, and 310 and 328 following. I think inspection will show that any treatment by comparing means or single positions would be unsatisfactory. I therefore omit discussion.

305. The record exhibits very finely the first day's development of a group. I take it that the component in longitude 198 is identical with 318 of the next rotation, thereby showing a motion in longitude changed from positive (due to divergence) to negative (from normal causes). The observations of 318 are two as follows :

at 237·571	. . 208·4 . .	+13·1
247·533	. . 206·7 . .	+13·4

Whence diurnal motions −10′ and +2′ . . . . for lat. +13°.

306. The first trace is again to be seen here.

			Means.	
at 215·5	. . 193·8	. . −16·4		
	189·4	. . −17·5	. . 191·6	. . −17·0
218·5	. . 193·8	. . −17·3		
	187·8	. . −17·5	. . 190·8	. . −17·4
219·5	. . 194·6	. . −17·8		
	187·5	. . −17·9	. . 191·0	. . −17·8

Diurnal motions −9′ and +12′ . . . for lat. −17°.

309. The group 327 in next rotation seems some new outgrowth of this, but cannot be identified with it.

			Means.	
at 230·6	55·3	−33·7		
	48·0	−35·6	51·7	−34·7
233·6	41·0	−35·3		
	54·6	−32·8	47·8	−34·1

Diurnal motions −78′ and −12′ . . . . for lat. −34°.

310. The observations of this and other groups following are too fragmentary to deal with.

315 and 332. The principal nucleus as follows:

at 237·6	271·2	−19·3
266·4	266·7	−19·5

At the first date divergence may not have wholly ceased, however

Diurnal motions −9′ and 0′ . . . . for lat. −19°.

319. See also 333 and 350. Record much interrupted.

320, 334 and 351 appear to be the same large group, but inspection of the graphical record is all that is possible.

322 and 335 may be the same, but the evidence is insufficient to proceed upon.

323 and 337 are no doubt the same group.

327. See remark on 309. Chief nucleus as follows:

at 250·562	47·2	−34·0
254·503	43·0	−33·9
257·572	39·9	−33·6

Diurnal motions −62′ and −4′ . . . . for lat. −34°.

328. See 310, with the latter part of which it corresponds.

334. See 319 and 350, to which I can only thus refer.

336 may be the same as 321. However take only observations—

at 273·430	141·2	−25·6
275·435	140·1	−25·8

Diurnal motions −33′ and +6′ . . . . for lat. −26°.

341 and 357 may be compared as follows:

at 289·6	348·2	+23·3
293·5	344·8	+23·7

Next rotation

at 310·5	339·3	+23·5
314·6	337·1	+23·3
315·5	336·8	+23·3

Diurnal motions −24′ and zero . . . . for lat. +23°.

350. See 319 and 334. 363 seems new.

353 and 365 may be related, but are not comparable.

355. A very large group, or perhaps two. See 370.

366. A very large spot in lat. —20° covering 12 degrees of longitude without a break, which afterwards divides and diverges, so that in the next rotation its parts appear as two groups 376 and 378, separated by a clear space of more than 15 degrees. Group 393 follows as a fresh outbreak in the same place.

373. See 363 which precedes, and 389 which follows.

374. Observed 4 times, as follows:

at 352·5	164·9	−18·3
355·5	164·0	−18·2
359·6	163·3	−19·2
360·6	162·5	−19·3

Diurnal motions −15′ and +10′ . . . . for lat. −19°.

379 and 382. Two singular groups of dots covering 40 degrees of longitude, of which it might be wished the record was more complete.

381. A large group which may have passed unseen at the next rotation between January 20th and February 3rd.

386. Two if not three groups close together, which the next rotation are 399 and 401. I think the result of comparison would however be questionable.

396 and 407 may I think be compared thus:

at 33·5	333·9	+ 7·5		
	328·1*	+ 7·5*	331·0	+ 7·5
61·7	344·7	+ 6·5		
	335·0	+ 7·3	339·8	+ 6·9

Diurnal motions +19′ and −1′ . . . . for lat. +7°.

406. Two fair observations. First nuclear, and then not.

at 54·542	345·4	−17·1
61·678	345·2	−16·8

Diurnal motions −2′ and −2′ . . . . for lat. −17°.

408. A normal circular spot.

at 61·7	289·2	+13·8
64·5	289·3	+13·2
66·5	288·8	+13·0
67·5	288·1	+12·6
68·6	288·7	+13·1

Diurnal motions −10′ and −8′ . . . . for lat. +13°.

412. One component seems to lose its penumbra, and after appearing as a dot, redevelop as a penumbral spot. The observations at this time were made by Mr. James Breen.

at 64·5	229·6	+20·0		
	223·6	+18·3	226·6	+19·2
66·5	229·0	+19·6		
	222·7	+18·4	225·8	+19·0
67·5	229·0	+19·7		
	222·4	+18·6	225·7	+19·2
68·6	228·8	+19·9		
	222·4	+19·0	225·6	+19·4
69·5	228·2	+19·7		
	221·5	+19·1	224·8	+19·4

Diurnal motions −16′ and +4′ . . . . for lat. +19°.

413 to 424. The observations are either insufficient or of a kind on which no discussion for motion can be based.

425. A spot which on April 1st showed penumbra.

at 89·515	308·2	+19·1
90·476	308·1	+18·8
92·589	307·7	+18·4

Diurnal motions −12′ and −12′ . . . . for lat. +18°.

433. May be the return of 423, but the record is too inconsecutive to be certain.

437. A detached spot observed twice only.

124·483	228·7	−16·4
127·508	228·7	−16·3

Diurnal motions zero and −2′ . . . . for lat. −16°.

439 and 455 are probably the same, but 455 consisting of two spots of which one must be new, it will be better to examine the first rotation alone.

124·483	185·1	−14·1

```
127·508 . . 185·1 . . −14·1
131·542 . . 185·1 . . −13·8
```

Diurnal motions zero and −2′ . . . . for lat. −14°.

The observation of the component of 455 corresponding is

```
155·652 . . 184·3 . . −13·3
```

440. A normal circular spot.

```
at 124·5 . . 148·6 . . −14·2
   127·5 . . 148·4 . . −14·0
   131·5 . . 147·8 . . −13·8
```

Diurnal motions −7′ and −3′ . . . . for lat. −14°.

442. I think the dots about it may be disregarded.

```
at 127·5 . . 119·9 . . − 6·5
   131·5 . . 120·1 . . − 6·7
```

Diurnal motions +3′ and +3′ . . . . for lat. −7°.

444. A large double group observed twice only.

```
at 127·5 . . 97·6  . . −22·4
             85·5  . . −22·2  . . 91·5 . . −22·3
   131·5 . . 95·4  . . −22·1
             83·4* . . −23·0* . . 89·4 . . −22·6
```

Diurnal motions −31′ and +4′ . . . . for lat. −23°.

445 and 464. There are the following observations.

```
          at 131·5 . . 33·2 . . +14·9
             141·7 . . 31·8 . . +15·2
464 . . . at 166·6 . . 28·8 . . +14·8
```

But the spots being merely large dots on the two last days, I think they cannot safely be combined, considering the interval of time between.

453 and 478. A neat circular spot.

```
First rotation   at 145·5 . . 220·9 . . +30·6
                    155·6 . . 214·9 . . +30·0
Second rotation     173·6 . . 209·9 . . +30·1
                    176·6 . . 208·3 . . +29·5
                    180·5 . . 205·7 . . +29·6
                    183·5 . . 203·3 . . +28·6
```

In this instance a normal spot of diameter less than 2 degrees preserving the same appearance throughout drifts in longitude over 17 degrees.

Diurnal motions −18′ and −2′ . . . . for lat. +30°.

456 and 480 are somewhat similar and in nearly the same position, but the relation is doubtful.

457. On the first day of observation exhibited very distinctly the deficiency of penumbra between two neighbouring nuclei, which formed one of the earliest peculiarities noticed by Dr. Wilson of Glasgow. The positions observed were

at 155·6 . . 136·2 . . +18·1
159·6 . . 134·9 . . +17·8 (mean)
162·5 . . 133·0 . . +18·0
Diurnal motions −30′ and zero . . . for lat. +18°.

There is at the next rotation a dot (481)
at 180·5 . . 132·3 . . +18·7
but the identity is very questionable.

459. A normal circular spot.

at 155·6 . . 99·3 . . −12·6
159·6 . . 99·4 . . −12·7
162·5 . . 99·5 . . −12·5
Diurnal motions +1′ and zero . . . . for lat. −13°.

465. Rather high north. Normal spot.

at 159·563 . . 25·3 . . +37·2
162·524 . . 22·4 . . +37·0
The first observation was taken near the limb, and there is no third one in the record.
Diurnal motions −55′ and −4′ . . . . for lat. +37°.

466. A nearly normal spot.

at 162·5 . . 9·4 . . +13·1
166·5 . . 10·4 . . +12·8
Diurnal motions +15′ and −4′ . . . . for lat. +13°.

470. A neat circular spot.

at 173·6 . . 306·8 . . −25·3
176·6 . . 308·2 . . −26·0

The last observation was taken very near the limb, and as the resulting motions are contradictory, I do not put them down.

471. A dot first without and then with penumbra.

at 166·6 . . 298·6 . . +16·0
173·6 . . 299·8 . . +15·6
Diurnal motions +10′ and −3′ . . . . for lat. +16°.

476. Observed three times, but as one of two components disappears, no comparison of positions can be made.

479. A rather large circular spot.

at 176·5	. . 180·0	. . −14·5
180·5	. . 180·3	. . −14·9
183·5	. . 180·1	. . −14·7

Diurnal motions zero and zero . . . . for lat. −15°.

485. A normal circular spot of 2° diameter.

at 183·525	. . 58·9	. . +29·3	(near the limb.)
187·542	. . 54·8	. . +29·2	
188·548	. . 54·1	. . +29·3	
190·599	. . 52·6	. . +29·7	

Diurnal motions −50′ and +6′ . . . . for lat. +29°.

486. Another circular penumbral spot.

at 187·542	. . 27·5	. . +10·1
188·548	. . 26·8	. . +10·2
190·599	. . 26·2	. . +10·0
197·553	. . 25·7	. . +10·9

Diurnal motions −8′ and +6′ . . . . for lat. +10°.

488. I disregard the influence of the small spots north-following.

at 190·6,	. . 2·2	. . +13·4
197·6	. . 2·2	. . +13·7

Diurnal motions zero and +3′ . . . . for lat. +13°.

491. The dots north-following are disregarded.

at 197·6	. . 299·9	. . + 7·2	
201·5	. . 302·1	. . + 8·3	
204·7	. . 304·2	. . + 9·4	(near the limb.)

Diurnal motions +38′ and +20′ . . . . for lat. +8°.

494. Should probably be counted as two groups.

A . .	at 201·5	. . 257·4	. . − 9·3		Means.
		248·6	. . − 8·5	. . 253·0	. . − 8·9
	204·7	. . 258·1	. . − 9·6		
		249·1	. . − 9·0	. . 253·6	. . − 9·3

Diurnal motions +12′ and +8′ . . . . for lat. −9°.

B . .	at 197·6	. . 247·4	. . −16·3	(near the limb.)
	201·5	. . 245·8	. . −16·0	

204·7	244·5	−15·8	
208·6	244·0	−15·2	(near the limb.)

Diurnal motions −20′ and −5′ . . . . for lat. −16°.

495. This large group was preceded in the former rotation by a group 476, which has a remarkable similarity to group 513 which follows in the next rotation.

496, 516, and 535. The principal nucleus comes round a third time. The group at first is of enormous area, some 16 by 8 degrees. I compare the positions of the principal nucleus :

First rotation	at 204·7	208·3	+20·8
	208·7	206·1	+21·8
Second rotation	229·5	200·5	+21·5
	232·5	200·0	+21·1
	236·5	198·3	+21·3
	239·5	197·4	+21·2
Third rotation	257·5	192·8	+21·3
	260·4	191·8	+21·8

Diurnal motions −16′ and zero . . . . for lat. +21°.

In which both rotations coincide.

497. Following the above large group at some distance.

at 208·6	182·3	+19·7
211·5	181·2	+19·6*

Diurnal motions −22′ and zero . . . . for lat. +20°.

500. A circular normal spot.

at 208·6	142·8	− 7·7
211·5	143·0	− 8·0

Diurnal motions +4′ and +6′ . . . . for lat. −8°.

502. A neat elongated spot.

208·6	93·1	−14·6	(near the limb)
211·5	91·8	−14·8	
215·5	92·7	−14·9	

The first observation throws doubt on the motion.

503. Afterwards the enormous group 520. Compare the whirl of penumbra in each.

508. One group disappears, and another breaks out. I compare two positions of a dot which follows :

at 222·735	298·0	+ 9·1
225·529	298·3	+ 9·5

Diurnal motions +6′ and +8′ . . . . for lat. +9°.

515. There is probably remaining divergence, and no means of ascertaining or avoiding its effect.

518. All these spots may be treated individually.

A . . at	232·5	. . 168·4	. . −19·3
	236·5	. . 167·6	. . −19·3
	239·5	. . 166·7	. . −19·7

Diurnal motions −14′ and +3′ . . . . for lat. −19°.

B . . at	232·5	. . 160·1	. . −24·9
	236·5	. . 158·5	. . −25·2
	239·5	. . 156·9	. . −25·2

Diurnal motions −28′ and +1′ . . . . for lat. −25°.

519. A detached spot of simple form.

at 232·5	. . 144·9	. . +22·6	(near the limb.)
236·5	. . 143·4	. . +22·9	
239·5	. . 141·6	. . +23·2	

Diurnal motions −28′ and +5′ . . . . for lat. +23°.

520. See 503 previous. The positions of the detached normal spot north-preceding may be compared.

at 236·5	. . 103·2	. . +28·3
239·5	. . 101·5	. . +27·9
243·5	. . 98·9	. . +27·8

Diurnal motions −38′ and −4′ . . . . for lat. +28°.

The observation of this very splendid group on September 1st has had some notoriety. Mr. Hodgson at Highgate and I at Redhill witnessed and described a singular outbreak of light which lasted about 5 minutes, and moved sensibly over the contour of the spot, an account of which has been sufficiently published by me in the Monthly Notices of the R. A. Society for November, 1859, and since reprinted in the Philos. Trans. Vol. 151, Part III, by Mr. Stewart, in his Memoir on the Great Magnetic Disturbances which extended from August 28th to Sept. 7th.

522 and 541 are probably related, but there being but one observation of each, comparison would be too precarious to be introduced here.

525. A normal spot observed twice only.

at 243·5	. . 356·9	. . +21·1
253·4	. . 354·6	. . +20·1

Diurnal motions −14′ and −6′ . . . . for lat. +21°.

526, 547, and 564. I suspect the last (564) is a third appearance of the principal nucleus of 526, but the inferred motions would be too conjectural for insertion.

From 526 and 547 we have

at 253·4	. . 349·3	. . −29·6
278·6	. . 333·9	. . −30·4
281·5	. . 331·4	. . −30·1

Whence diurnal motions −38′ and +2′ . . . . for lat. −30°.

531 and 550. Rather too large for exact observation.

at 253·4	. . 249·9	. . + 7·1
257·5	. . 251·3	. . + 7·1
260·4	. . 252·3	. . + 7·6

Next rotation.

at 278·6	. . 256·5	. . + 8·5	(near the limb.)
281·5	. . 255·8	. . + 9·1	

Diurnal motions +13′ and +4′ . . . . for lat. +8°.

533 and 553 may be the same, but cannot safely be treated as such.

537 and 556 occur in the same position in successive rotations, but there is but one observation of each.

543, 560 and 583 are probably the same group.

546. Seen twice only.

at 278·6	. . 343·4	. . −11·6
281·5	. . 343·4	. . −11·6

Diurnal motions zero and zero . . . . for lat. −12°.

548. A dot, with an interval of 3 days.

at 278·6	. . 295·5	. . +28·8
281·5	. . 298·6	. . +28·6

I suspect the longitude, or the identity.

551 and 569. Some change of form takes place.

at 281·5	. . 226·2	. . +25·5*
292·5	. . 221·5	. . +25·3

Second rotation.

at 313·5	. . 215·0	. . +26·1
316·5	. . 213·7	. . +26·4

Diurnal motions −20′ and +2′ . . . . for lat. +26°.

553. I think the two positions may be safely compared.

at 281·5	. . 217·8	. . + 6·8	
292·5	. . 218·6	. . + 6·0	(near the limb.)

Diurnal motions +4′ and −4′ . . . . . . for lat. +6°.

554 and 571 are probably related, but the observations will not bear discussion.

558 and 578. The same remark applies.

560. See 543 and 583.

564. See 526. Treated individually there are

at 306·5	. . 306·8	. . −32·6	
313·5	. . 300·7	. . −32·0	(near the limb).

Diurnal motions −52′ and −5′ . . . . for lat. −32°.

566. A small spot seen twice.

at 313·5	. . 246·0	. . −28·9
316·5	. . 243·1	. . −29·1

Diurnal motions −58′ and +4′ . . . . for lat. −29°.

567. Twice observed. Dots following.

at 313·5	. . 242·2	. . − 6·8
316·5	. . 245·7	. . − 4·8

I think divergence vitiates the result.

568. Two large equal components.

			Means.	
at 313·5	. . 242·1	. . −13·5		
	233·9	. . −15·6	. . 238·0	. . −14·6
316·5	. . 242·4	. . −13·4		
	233·4	. . −15·4	. . 237·9	. . −14·4

Diurnal motions −2′ and −4′ . . . . for lat. −14°.

573 and 592. The principal spot recurs.

573 . .	at 316·5	. . 147·9	. . +26·5
	320·5	. . 146·4	. . +26·5
	323·5	. . 146·6	. . +26·7
592 . .	at 344·5	. . 142·4	. . +25·4
	348·5	. . 142·0	. . +24·7
	351·5	. . 141·8	. . +24·3

Whence diurnal motions −10′ and −4′ . . for lat. +26°.

575. A small circular penumbral spot.

at 316·5	120·9	−28·4
320·5	117·8	−28·7
323·5	116·1	−27·9
327·5	113·6	−28·0

Diurnal motions −40′ and −3′ . . . . for lat. −28°.

577. A normal spot.

at 320·5	97·1	+13·5
323·5	96·8	+14·0

Diurnal motions −6′ and +10′ . . . . for lat. +14°.

579, 595 and 613. Three successive rotations.

First rotation.

at 320·5	92·3	−11·6	
323·5	93·7	−11·5	
327·5	93·1	−11·9	

Second rotation.

at 344·5	94·0	−12·2	(near the limb).
348·5	94·3	−11·7	
351·5	93·4	−11·1	
355·5	92·5	−10·6	

Third rotation.

at 375·5	92·0	−11·2
380·5	92·1	−11·6
381·5	92·4	−11·5

The motion in longitude is first slightly positive and then negative, and we may safely conclude on the whole

Diurnal motions zero and zero . . . . for lat. −12°.

581 and 598. See diagrams.

First rotation.

at 323·5	44·0	+23·7
327·5	43·5	+22·6
330·5	44·7	+21·5

Second rotation.

at 348·5	46·6*	+21·6	(near the limb.)
351·5	44·7	+22·1	
355·5	43·4	+22·0	
360·5	39·6*	+22·1	(near the limb.)

Diurnal motions −2′ and −1′ . . . . for lat. +22°.

582. A small circular spot, well defined.

at 323·5	. . 42·3	. . +14·0
327·5	. . 42·1	. . +14·3
330·5	. . 41·9	. . +14·4

Diurnal motions $-3'$ and $+3'$ . . . . for lat. $+14°$.

584. One of two spots disappears and the other shows signs of divergence from it, precluding results for motion.

586 and 603. Probably the same, but the last observation of 586 and the first of 603 were taken when the spot was so near the limb that comparison with the only other observation obtained would yield no reliable result. See 513 for great similarity in appearance.

588. See 608 and 630 : the last probably different.

589. The figures show a very rapid disappearance of the larger component in the course of two days.

594 and 612. Only one observation the first rotation. When come round the second time, much diverged. On January 11th the diagram indicates a second outbreak in the place of the first, and between the three positions of the remains of the first outbreak. Discussion for motion seems impracticable.

597. A rather large normal spot.

at 348·5	. . 69·8	. . −16·3
351·5	. . 68·8	. . −15·9
355·5	. . 68·3	. . −15·4

Diurnal motions $-13'$ and $-8'$ . . . . for lat. $-16°$.

599. Two groups. One the remains of 583. Trace of the other recurs as 616. No conclusions can be drawn.

601. A large normal spot.

at 355·5	. . 324·8	. . −18·9	
360·5	. . 321·5	. . −19·1	
366·5	. . 319·4	. . −18·7	(near the limb.)

Diurnal motions $-29'$ and $-1'$ . . . . for lat. $-19°$.

604. In the next rotation 627 takes this position. I consider the following points comparable as under.

			Means.	
at 1·5	. . 242·7	. . −25·0		
	236·5	. . −28·3	. . 239·6	. . −26·7

6·5 . . 241·3 . . −23·6
235·1 . . −28·4 . . 238·2 . . −26·0
Diurnal motions −17′ and −8′ . . . . for lat. −26°.

608. A small circular spot. Another outbreak below, which may be the first trace of 630. Also see 588.

at 1·5	. .	204·7	. .	+22·3
6·5	. .	203·4	. .	+22·4

Diurnal motions −16′ and +1′ . . . . for lat. +22°.

611. There is a fresh outbreak (637) here the next rotation.

612. See the remarks under 594.

613. Two spots, one the remains of 579 and 595: the other which is near on January 16th is observed only once more and does not come round again.

B	at 15·5	. .	83·3	. .	− 9·8
	16·5	. .	83·8	. .	−10·0

Diurnal motions +30′ and +12′ . . . for lat. −10°.

616. See the remarks under 599 and the figures.

617. A rather large group in lat. 20° N., of which the first trace appears to have been seen. The growth and decay are both rapid. It does not recur.

618. A large spot generally circular. The nucleus becomes double, and the changes prevent conclusions of much value. The positions are

at 15·5	. .	1·5	. .	+ 8·0
16·5	. .	2·7	. .	+ 7·4
18·5	. .	2·1	. .	+ 7·5
21·5	. .	1·2	. .	+ 7·3
22·5	. .	0·8	. .	+ 7·5
23·5	. .	1·1	. .	+ 7·7

Whence diurnal motions −11′ and −1′ . . . . for lat. +8°.

619. Another smaller circular spot, the nucleus of which also undergoes some change.

at 15·5	. .	358·5	. .	−24·4
16·5	. .	358·7	. .	−24·4
18·5	. .	357·5	. .	−24·7
21·5	. .	356·0	. .	−25·0
22·5	. .	355·4	. .	−25·2
23·5	. .	355·2	. .	−25·3

Diurnal motions −28′ and +7′ . . . . for lat. −25°.

620. A large dot observed twice only.

at 21·5	344·5	+30·9
22·5	344·7	+30·8

Diurnal motions +12′ and −6′ . . . . for lat. +31°.

622. May, I think, be treated as under, as the dots which follow do not seem to affect the motion.

at 18·5	319·4	−9·2
21·5	319·5	−8·5
22·5	320·0	−8·2
23·5	320·9	−7·7
27·5	320·9	−7·8

Diurnal motions +10′ and −8′ . . . . for lat. −9°.

627. See 604 and 650. I can only refer to the diagrams.

628. Motion in longitude is positive as the figures show, but the observations are insufficient.

629. The three middle observations will bear comparison.

			Means.	
at 29·6	220·0	+5·1		
	214·1	+5·9	217·0	+5·5
31·5	221·3	+5·1		
	213·8	+5·7	217·5	+5·4
32·5	221·7	+5·3		
	213·9	+6·3	217·8	+5·8

Diurnal motions +16′ and +8′ . . . . for lat. +6°.

630. A large group of which 608 may be the first trace. The diagrams can alone be referred to.

632. Observed with penumbra on Feb. 1st only.

at 29·6	190·4	+17·9
31·5	191·3	+18·2
32·5	191·7	+18·4

Diurnal motions +25′ and +10′ . . . . for lat. +18°.

636. Groups in this locality the two next rotations.

640. A group of many spots of which remains recur in 656, though not admitting of identification or discussion in any way. See figures.

641. Probably two groups. Can do nothing with either.

645. A group in rather high North latitude.

at 43·5	33·7	+33·4	Means.	
	28·6	+35·2	31·2	+34·3
45·5	33·7	+32·4		
	25·7	+36·1	29·7	+34·2
47·5	33·7	+32·0		
	23·5*	+37·0*	28·6	+34·5
50·4	31·5	+32·0		
	20·0	+37·9	25·8	+34·9

Whence diurnal motions −48′ and +7′ . . . . for lat. +34°.

646 and 663. 687 also follows in the same locality. Inspection shows that the two first have small motions, apart from divergence. The following positions may be compared.

at 42·5	28·5	+14·4	Means.	
	20·5	+17·0	24·5	+15·7
43·5	29·7	+14·2		
	19·8	+16·6	24·7	+15·4
45·5	30·3	+13·8		
	19·8	+16·6	25·0	+15·2
47·5	30·7	+13·6		
	20·0	+17·1	25·4	+15·3

Diurnal motions +10′ and −5′ . . . . for lat. +15°.

647. Two distinct groups. The only comparable points belong to the second one.

at 50·4	346·1	−14·6
52·6	346·4	−14·3

Diurnal motions +8′ and −8′ . . . . for lat. −14°.

648, 670 and 692. A group which loses all but its principal spot.

The positions of this nucleus were

First rotation	at 53·5	299·1	+20·2
	54·5	299·1	+20·0
Second	at 74·5	297·7	+20·9
	77·6	296·4	+20·6
	81·6	294·5	+20·0
	83·6	294·1	+20·0
	84·5	293·8	+20·2
	85·5	293·1	+19·9
Third	at 105·5	292·2	+21·3
	106·5	292·0	+21·1
	107·5	292·2	+21·0
	108·5	291·9	+20·5

By the first and second rotations

Diurnal motions −9′ and +0′ . . . . for lat. +20°.

By the second and third −7′ and +2′ . . . . for lat. +21 .

649. I omit the observations of Feb. 20th and 27th, for reasons which will appear on reference to the diagrams.

at 52·6	246·6	−17·6
53·5	246·8	−17·6
54·5	246·5	−17·7
57·5	246·6	−17·8
59·5	245·9	−18·3
60·6	246·2	−18·0
61·6	245·7	−18·4

Whence diurnal motions −6′ and +5′ . . . . for lat. −18°.

650. May be a part of 627. A neat normal spot.

at 50·432	240·8	−24·1	(near the limb.)
52·584	240·5	−24·0	
53·541	240·3	−23·9	
54·490	239·5	−24·1	
57·500	238·4	−24·3	
59·495	236·9	−25·0	
60·576	237·2	−24·5	
61·636	237·4	−24·6	

Diurnal motions −24′ and +5′ . . . . for lat. −24°.

651. A group nearly in the position previously occupied by 633, though apparently different. The changes shown in the diagrams are the chief feature noticeable, other discussion being impracticable.

652 and 654 are also groups of the same kind, the outlines and nuclei undergoing violent changes. They appear to be respectively identical with 635 and 636 of the previous rotation.

653 and 677 A. A single spot of drawn-out form.

First rotation	at 57·5	169·6	−6·8	
	59·5	169·1	−6·9	
	60·5	169·6	−6·9	
	61·6	169·1	−7·1	omit
	64·4	169·4	−6·5	
	65·5	169·6	−6·3	
	67·6	168·7	−6·5	
Second	at 83·5	172·9	−6·4	
	84·5	172·7	−6·5	
	85·5	172·9	−6·6	

Diurnal motions +10′ and −1′ . . . . for lat. −7°.

655. Not susceptible of treatment. See figures.

656. See previous rotation. A number of dots over more than 40 degrees of longitude; one or two of which only came to any size. The following positions of the chief spot may be compared;

at 61·6	. . 108·2 . .	−15·8
64·4	. . 108·3 . .	−15·0
65·5	. . 108·6 . .	−14·7
67·6	. . 109·0 . .	−14·7
69·5	. . 109·2 . .	−14·7

Diurnal motions +9′ and −2′ . . . . for lat. −15°.

658. A medium nuclear circular spot.

at 64·4	. . 76·6 . .	+18·5
65·5	. . 76·6 . .	+18·8
67·6	. . 76·7 . .	+18·9
69·5	. . 77·0 . .	+19·0
72·4	. . 76·4 . .	+18·4
74·5	. . 76·1 . .	+18·5

Diurnal motions −1′ and −1′ . . . . for lat. +19°.

659. The only comparable points are these

at 64·4	. . 72·0 . .	−5·5
65·4	. . 72·4 . .	−5·3

Diurnal motions +24′ and −12′ . . . . for lat. −5°.

The observations of the spot seen in the position 68·4 by −3°, on March 8th and 15th, are not comparable, inasmuch as no such spot was visible on the 10th and 13th.

660. Either different dots or discordant observations.

661—665. These groups admit of no comment.

666. Two separate outbreaks of short duration, each but once observed, which appear to correspond to groups 689 and 691 of the next rotation.

667. A group seen twice on March 13 and 15. Not seen on the 18th. In the next rotation, 690 occupies the same position, and in the third rotation a large group (771) succeeds. There is no question that the three are successive independent formations or outbreaks in the same region. This and other cases (666 immediately before is another) indicate that the source of energy which leads to the formation of a spot or group is not always exhausted on the disappearance of the group; that corresponding to the visible spot there is an invisible overhanging cloud or underlying volcano, the discharge of which rupturing or displacing the photosphere is sometimes intermittent.

670. See 648 and 692.

671. A plain dot observed four times.

at 81·6	. . 247·0	. . +5·8
83·6	. . 248·6	. . +5·7
84·5	. . 249·1	. . +5·8
85·5	. . 248·6	. . +5·2

Diurnal motions +30′ and −7′ . . . . for lat. +6°.

672 and 696 correspond in a certain degree, but the evidence of their identity is open to doubt. The relative points in neither admit of discussion.

673. Two groups A and B. From the first I find:

A. . . .	at 81·6	. . 238·5	. . +13·6
	83·6	. . 238·0	. . +13·5
	84·5	. . 238·0	. . +13·1
	85·5	. . 238·2	. . +12·9

Whence diurnal motions −6′ and −6′ . . . . for lat. +13°.

B. corresponds to 697, the next rotation.

674. A large single spot of singular but not uncommon form, which I suspect divided in two between March 29th and April 1st. The dots in the neighbourhood varied from day to day. The observations, which did not admit of much precision, are as follows:

at 81·6	. . 208·6	. . −13·4
83·6	. . 208·0	. . −13·5
84·5	. . 208·5	. . −13·6
85·5	. . 208·3	. . −14·2
88·6	. . 207·7	. . −13·6
91·6	. . 207·6	. . −12·8

Diurnal motions −6′ and zero . . . . for lat. −14°.

675. The first trace appears to have been caught. Reference to the figures only is possible.

677. A and B. Respecting A, see 653. B must, I think, be regarded as a second outbreak of the same group. The positions cannot be compared.

678. A small circular spot, which is probably the remains of 654, though not comparable with it.

at 84·5	. . 164·3	. . +19·3	(near the limb.)
85·5	. . 163·8	. . +19·3	
88·6	. . 162·1	. . +19·7	

Diurnal motions −36′ and +8′ . . . . for lat. +19°.

679. The following may be compared:

at 88·6	. . 167·3	. . −22·5
91·6	. . 167·9	. . −22·6

93·6	. .	167·4	. .	−22·6
94·6	. .	167·4	. .	−22·5

Diurnal motions −3′ and zero . . . . for lat. −22°.

681. Mere dots. Compare the following:

at 93·6	. .	139·6	. .	−17·3
96·6	. .	138·5	. .	−17·5

The identity, however, cannot be inferred, since no such spots were seen on the intermediate day.

683. A single nuclear spot changes to one of three confluent spots, and then degrades to dots. I think the motion may be inferred from the following:

at 91·6	. .	82·0	. .	−4·5
93·6	. .	82·3	. .	−4·6
94·6	. .	82·3	. .	−4·2
96·6	. .	82·6	. .	−4·6

Diurnal motions +6′ and −3′ . . . . for lat. −4°.

685 corresponds to a part of 709; which see.

687. Two distinct formations. The second first appears as two dots on April 7th.

Spot A. . . .	at 94·6	. .	26·5	. .	+20·0	(near the limb.)
	96·6	. .	26·8	. .	+20·2	
	97·5	. .	26·9	. .	+20·3	
	99·5	. .	26·8	. .	+19·9	
	100·6	. .	26·4	. .	+19·5	

Diurnal motions −5′ and −10′ . . . . for lat. +20°.

For the second, see the diagrams. It is possible that the single spot in lat. +15°, which remains on April 15th, may be the same as 709 B.

688. Changes too much for comparison of parts.

689. The same. See the drawings.

691. The observations of the principal spot are not so good as usual. 712 follows near here.

692. See 648, of which it is the third appearance.

693. Seen twice only, as follows:

						Means.		
at 111·4	. .	271·7	. .	−20·1				
		268·0	. .	−21·9	. .	269·8	. .	−21·0
112·6	. .	272·1	. .	−20·6				
		267·1	. .	−22·2	. .	269·6	. .	−21·4

Diurnal motions too uncertain to enter.

695. See diagrams. I consider discussion impracticable.

696. See 672, to which it seems to correspond.

697. The portion in lat. +13° appears to be a part of 673 B come on again, but the form undergoes too much change for motions to be inferred. The more north spot was observed as follows:

at 106·556	230·6	+19·4
107·485	230·5	+19·2
108·512	229·7	+19·5
111·363	229·1	+20·0
112·556	229·0	+20·1
115·581	228·1	+20·6

Diurnal motions −15′ and +7′ . . . . for lat. +20°.

701, 702 and 704. See 724 and 746, which seem to be successive reproductions of disturbance in the same region. Of 701 I find observations

at 115·581	136·7	−12·0
118·595	137·0	−12·1
119·535	137·7	−12·0
120·506	138·0	−12·5
121·387	138·3	−12·5
122·525	138·4	−12·7
123·660	138·7	−12·1
124·496	138·3	−12·2

Diurnal motions +18′ and +4′ . . . . for lat. −12°.

702. Observed three times. Neat circular spot.

at 121·387	131·7	−22·1
122·525	132·7	−21·3
123·660	133·2	−21·1

Diurnal motions +24′ and −15′ . . . . for lat. −22°.

Still more abnormal than the preceding.

704. First trace recorded as a sprinkling of dots. The group does not admit of discussion, but the diagrams, which are nearly consecutive, show that 724 the next rotation must be a fresh formation.

703. Two dots lasting two days, and then gone. The next rotation a dot 723 occupies almost exactly the position of one of them. See 723.

			Means.	
at 119·535	126·9	+17·0		
	123·5	+17·4	125·2	+17·2
120·506	127·0	+17·1		
	122·8	+17·5	124·9	+17·3

Diurnal motions −18′ and +6′ . . . . for lat. +17°.

705. Two groups A and B. See the figures. Of the dot A the positions were,

at 119·535	99·6	+14·5
120·506	99·8	+13·8
121·387	100·0	+13·8

Diurnal motions +12′ and −10′ (?) . . . . for lat. +14°.

706. After two rotations, see 748. The diagrams show a peculiar motion of the principal nucleus under the joint actions of divergence and drift. A trajectory through the projected positions is conspicuously curved. The drift may be best inferred from the following observations.

			Means.	
at 121·4	97·4	+32·5		
	93·7	+33·6	95·5	+33·1
122·5	98·4	+32·5		
	91·3	+34·6	94·9	+33·5
123·7	. . . . . .	. . .		
124·5	. . . . . .	. . .		
125·5	99·8	+32·4		
	87·8	+34·7	93·8	+33·6
126·6	98·5	+33·0		
	85·3	+34·6	91·9	+33·8
127·5	. . . . . .	. . .		

Diurnal motions −36′ and +6′ . . . . for lat. +33°.

Divergence the first two days =7 degrees. See drawings. Note also the general direction of the group.

707. The divergence being visible on the face of the drawings, neither spot can be treated separately; and the changes of the principal nucleus prevent their being combined. It will be noted that their divergence is sensible when these two spots are as much as 15 degrees apart. The principal spot subdivides not into two but into several parts.

708. A group of unusual development and permanence for its position so near the Equator. It appears to me that the whole group swings round, and while both principal components approach the Equator, the one in longitude 60° to 65° approaches the quicker. Compare the following—

			Means.	
at 124·5	60·0*	+5·0*		
	52·6	+5·0	56·3	+5·0
125·5	61·9	+3·9		
	52·6	+4·9	57·2	+4·4
126·6	63·3	+3·5		
	52·1	+4·8	57·7	+4·2
127·5	64·1	+2·5		
	51·6	+4·3	57·9	+3·4

129·6	. . 65·3	. . +2·1		
	51·4	. . +3·8	. . 58·4	. . +2·9

Diurnal motions +22′ and −22′ . . . . for lat. +4°.

This group is of unusual value for the subject.

709. A and B. Two distinct groups. The first may correspond to 685. Whether or no, the motions are very small and not susceptible of nice determination. The second B may be and probably is the same as 687 B.

687 B. . .	at 105·5	. . 24·0	. . +15·4	
709 B. . .	at 122·5	. . 25·8	. . +15·9	(near the limb.)
	123·7	. . 24·9	. . +15·6	
	124·5	. . 25·2	. . +15·4	
	125·5	. . 24·5	. . +15·1	
	126·6	. . 24·8	. . +15·2	
	127·5	. . 24·8	. . +14·8	

It will be more secure to treat 709 B separately: whence

Diurnal motions −6′ and zero . . . . for lat. +15°.

710, 730, 753 and 777. See also 664. Taking those observations of 710 which from the form of the spot admitted of tolerable precision, I find

	at 122·5	. . 22·3	. . −11·7
	123·6	. . 21·9	. . −11·5
	124·5	. . 22·2	. . −11·5
	125·4	. . 21·9	. . −11·7
	. . .	. . . . .	
	129·6	. . 21·5	. . −11·0
	133·6	. . 21·0	. . −11·5
Second rotation (730).			
	at 150·4	. . 21·4	. . −12·6
	156·4	. . 20·2	. . −12·5
	157·5	. . 19·7	. . −12·8
	159·5	. . 19·1	. . −12·8
Third rotation (753).			
	at 177·3	. . 19·9	. . −12·8
	182·6	. . 19·1	. . −12·3
	184·6	. . 18·6	. . −12·5
	185·5	. . 18·5	. . −12·4
	187·7	. . 18·2	. . −12·2
Fourth rotation (777).			
	at 205·6	. . 18·9	. . −11·7
	206·6	. . 18·7	. . −11·5

We may take as mean positions

1st rotation	at 126·6	21·8	−11·5
2nd ,,	156·0	20·1	−12·7
3rd ,,	183·5	18·9	−12·4
4th ,,	206·0	18·8	−11·6

The motion in longitude decreases to zero and the motion in latitude changes sign. We may take for combination with other results, and as of some weight the results

Diurnal motions −3′ and +2′ . . . . for lat. −12°.
−2′ and −1′ . . . . ,, . . ,,
zero and −2′ . . . . ,, . . ,,

This region seems subject to repeated disturbance.

711. A fine well-developed group.

			Means.	
at 125·5	354·8	+23·0		
	346·7	+24·5	350·8	+23·8
126·6	355·8	+22·4		
	345·8	+24·8	350·8	+23·6
127·5	356·0	+22·5		
	344·7	+24·9	350·4	+23·7
129·6	356·6	+22·5		
	343·1	+25·1	349·8	+23·8
133·6	356·7	+22·8		
	340·9	+25·7	348·8	+24·2
135·7	355·3	+23·1		
	338·5	+25·4	346·9	+24·2

Diurnal motions −20′ and +4′ . . . . for lat. +24°.

712. It is difficult to say whether this is a renewal or a recurrence of 691. The positions are

of 691	at 105·5	349·3	+14·7
	106·6	348·8	+14·7
	107·5	349·1	+15·0
of 712	at 125·5	349·1	+13·8
	126·6	348·8	+13·6
	127·5	348·4	+13·5
	129·6	348·2	+13·4
	133·6	347·2	+14·2
	135·7	345·2	+13·5

Taking them together as the same spot

Diurnal motions − 3′ and −3′ . . . . for lat. +14°.
Taking 712 alone −15′ and zero . . . . for lat. +14°.

I take either result to be equally admissible.

715. Groups 735 and 757 follow in the same place as successive independent formations. See diagrams.

			Means.	
at 129·6	307·4	+13·5		
	305·2	+18·2	306·3	+15·9
133·6	309·7*	+13·0*		
	302·8	+17·1	305·2	+15·0
135·7	309·3	+13·0		
	300·5	+16·3	304·9	+14·7

Diurnal motions −14′ and −12′ . . . . for lat. +15°.

717. Appears to be two outbreaks in nearly the same region. Of the second, I read off from the projected drawings the following mean positions.

at 140·5	250·0	−25·0
141·5	251·0	−24·6
142·5	251·9	−24·5
143·5	252·9	−24·4

Diurnal motions +55′ and −12′ . . . . for lat. −25°.

The motion in longitude will be found very abnormal.

718. See diagrams. The drift appears to be again positive, though the changes in the group prevent its determination. This group dies away on May 24th, and the next rotation the same spot is found disturbed by 741, which broke out between June 14th and 18th.

719. Defies discussion. Changing every day.

720. A well defined dot.

at 140·5	169·8	+15·3
141·5	169·1	+15·2
142·5	168·6	+14·9
143·6	168·7	+15·2
144·6	168·7	+15·5

Diurnal motions −15′ and +3′ . . . . for lat. +15°.

721. I think the following positions of the principal spot may be compared notwithstanding the dots around.

at 140·5	165·0	−22·2
142·5	164·7	−21·3
143·6	163·8	−22·1
144·6	163·5	−22·0

Diurnal motions −30′ and +7′ . . . . for lat. −22°.

722. A small group of dots of a binary form.

			Means.	
at 140·5 . .	153·8 . .	+19·3		
	150·4* . .	+20·5* . .	152·1 . .	+19·9
141·5 . .	155·6 . .	+18·5		
	151·4 . .	+20·5 . .	153·5 . .	+19·5
142·5 . .	155·8 . .	+17·8		
	151·7 . .	+19·8 . .	153·8 . .	+18·8
143·6 . .	156·3 . .	+17·5		
	151·7 . .	+20·2 . .	154·0 . .	+18·8

Diurnal motions $+33'$ and $-27'$ . . . . for lat. $+19°$.

The positive motion in longitude seems beyond dispute.

723. I point out one feature which occurs here, and which has occurred frequently before from time to time, the bend in the trajectory of successive positions near the limb to the left at the top of the page (coming on), and to the right at the bottom (going off). See groups 158, 161, and 291; and 58 and 139 for the opposite. In the series where it appears it would indicate that the surface of the photosphere around the particular spot was sensibly depressed, as a little consideration will readily show. It does not always occur and is not necessarily the result of depression, for 720 on the same page shows the same bend when well advanced on the Sun. 723 does not recur, and the observations indicate a fresh formation on May 27th. Compare these three—

at 142·5 . .	126·9 . .	+16·7
143·6 . .	126·3 . .	+16·5
144·6 . .	126·2 . .	+16·9

Whence diurnal motions $-12'$ and $+3'$ . . . . for lat. $+17°$.

724. Another group in the position of 704 preceding, but the positions of which will not bear comparison.

725. A circular penumbral spot of normal form.

at 143·6 . .	106·6 . .	+ 7·9
144·6 . .	107·4 . .	+ 8·2
147·5 . .	108·0 . .	+ 7·7
150·4 . .	108·3 . .	+ 7·8

Diurnal motions $+14'$ and $-4'$ . . . . for lat. $+8°$.

726. A spot of large area, but short duration. No trace of it the next rotation. Too indefinite in form for accurate discussion.

728. A neat circular spot in 30° S., seen but twice.

at 147·5 . .	63·6 . .	−30·0
150.4 . .	62·4 . .	−30·7

Diurnal motions $-24'$ and $+15'$ . . . . for lat. $-30°$.

730. Consists of two. The chief spot in lat. $-12°$ has been already discussed under 710. The other part is fresh and an independent form, which seems repeated the next rotation in 753.

731. A group, the changes in which are well shown by the drawings, but which cannot be further treated.

733. A small group of which the following may be taken.

at 157·5	326·9	+16·6
159·5	326·0	+16·6
161·7	326·0	+16·6
162·6	325·4	+16·4
165·4	325·2	+16·5

Diurnal motions $-13'$ and $-2'$ . . . . for lat. $+17°$.

735. See 715 and 757, of which it appears to be an intermediate formation. Also see diagrams.

736. A neat circular spot as follows:

at 157·5	294·9	−17·6
159·5	296·6	−17·7
161·7	297·6	−18·0
162·6	297·7	−18·3

Diurnal motions $+34'$ and $+9'$ . . . . for lat. $-18°$.

But I suspect the influence of divergence is sensible.

738. See the kind of divergence here shown. The two nuclei on the right separate very little, while they jointly diverge from the component on the left.

739. Penumbra in both spots thrown outside.

			Means.	
at 165·4	224·4	−16·1		
	220·3	−16·0	222·4	−16·1
169·6	226·1	−15·7		
	219·7	−16·6	222·9	−16·2

Diurnal motions $+8'$ and $+1'$ . . . . for lat. $-16°$.

741. See 718, of which it seems a repetition.

742. Appears to have been three small separate outbreaks, of which nothing more can be made.

745. Seems to be properly two groups, if not three. None are susceptible of arithmetic discussion. 722 seems a precursor of part of this group.

746. Should manifestly be entered as two groups. Notice the mutual repulsion between the "following" component of the "preceding" group, and the "preceding" component of the "following" group. Under the peculiar circumstances I do not attempt to deduce motion.

747. A circular penumbral spot.

at 173·5	97·8	+11·9
176·6	99·8	+11·5
177·3	100·3	+11·5

Diurnal motions +36′ and −6′ . . . . for lat. +12°.

748. Observed as follows:

at 173·5	96·3	+30·8	
176·6	96·2	+30·9	
177·3	95·8	+31·3	
182·6	91·0	+31·9	(near the limb.)

Diurnal motions −30′ and +10′ . . . . for lat. +31°.

749. Two outbreaks as the diagrams show, the second being probably the commencement of 773. Of the first I find the positions

at 173·5	77·3	−15·0
176·6	76·9	−15·5
177·3	77·1	−15·3

Diurnal motions −3′ and +5′ . . . . for lat. −15°.

750. The want of observations between the second and third obtained renders it impossible to treat this group with security.

751 and 775. The principal nucleus recurs. In other respects the diagrams must be referred to.

at 182·576	44·4	+11·7
184·563	43·7	+11·7
185·530	42·9	+11·8

Second rotation.

at 203·490	43·4	+10·8
205·629	42·9	+11·0
206·641	42·9	+11·0
211·545	42·8	+11·3
213·664	42·5	+11·5

Whence, assuming the identity as reliable,

Diurnal motions −2′ and −2′ . . . . for lat. +11°.

752 and 776. Group 799 seems by the drawing of Aug. 17th to be a fresh outbreak

of the same. The nucleus in longitude 45° of 752 seems to recur as the principal spot of 776, in which case the following positions are comparable.

752 . . .	at 184·6 . .	45·7 . .	+22·2
	185·5 . .	45·3 . .	+22·5
776 . . .	at 203·5 . .	39·6 . .	+23·7
	205·6 . .	38·3 . .	+24·2

Whence diurnal motions −20′ and +5′ . . . . for lat. +23°.

753. See 710 and 730. The motion of the spot in lat. —12° has been discussed under 710. The spot in long. 28° and lat. —16° seems to be a fresh outbreak of that part of 710 and may even be repeated in 777 in long. 33°. See 777.

754 and 779. This enormous group has large negative motion in longitude, and I think that the principal nucleus of 754, which about July 3rd was in longitude 359° is comparable with 779, which at July 31st is in 347°: but the changes of form during the first rotation are so great, that it will be more satisfactory to treat 779 by itself as follows:

at 206·6 . .	350·4 . .	+26·1
211·5 . .	347·4 . .	+26·1
213·7 . .	346·9 . .	+26·3
216·5 . .	344·9 . .	+26·5
217·6 . .	344·3 . .	+25·9

Whence diurnal motions −30′ and +1′ . . . . for lat. +26°.

755. Two groups. Of the first, the following:

			Means.	
at 184·6 . .	354·0 . .	+7·8		
	348·7 . .	+7·7 . .	351·3 . .	+7·7
185·5 . .	355·3 . .	+7·7		
	347·8 . .	+7·5 . .	351·5 . .	+7·6

Diurnal motions +12′ and −6′ . . . . for lat. +8°.

Of the second there are four comparable places:

			Means.	
at 182·6 . .	343·3 . .	+12·4		
	334·9 . .	+14·4 . .	339·1 . .	+13·4
184·6 . .	342·5 . .	+11·9		
	334·9 . .	+13·7 . .	338·7 . .	+12·8
185·5 . .	342·7 . .	+12·1		
	334·4 . .	+14·1 . .	338·6 . .	+13·1
187·7 . .	343·1 . .	+12·7		
	334·6 . .	+13·9 . .	338·8 . .	+13·3

Diurnal motions −4′ and +2′ . . . . for lat. +13°.

756. See 780, the next rotation.

757. See 715 and 735. I take the following

at 182·6	311·4	+16·4
184·6	309·9	+15·9
185·5	309·7	+16·1
187·7	309·3	+16·4
189·6	309·1	+16·4
190·5	308·3	+16·5

Whence diurnal motions −17′ and +3′ . . . . for lat. +16°.

758. A moderate sized spot with 2, 3, and 4 nuclei.

at 182·6	312·1	−16·9
184·6	310·3	−17·1
185·5	309·4	−17·4
187·7	309·1	−17·2
189·6	308·5	−17·2
190·5	308·1	−17·2
192·6	308·2	−17·6

Diurnal motions −21′ and +2′ . . . . for lat. −17°.

760. A fine single nuclear spot. Dots around it.

at 185·5	265·8	−22·2
187·7	265·1	−22·2
189·6	265·1	−22·2
190·5	264·5	−22·5
192·6	263·8	−22·5
193·7	263·6	−22·5
194·5	262·8	−22·6

Diurnal motions −20′ and +2′ . . . . for lat. −22°.

761. The portions of this group developed on July 8th show its real extent, and explain the after motion of the principal nucleus, which is then seen to be vitiated by divergence. See figures.

762 and 789. Seen on the Sun as the principal spot on the day of the eclipse, which was total in Spain on the 18th of July.

First rotation. 762.

at 190·5	190·7	+19·3	
192·6	188·9	+19·1	
193·7	189·2	+19·2	
194·5	188·6	+18·9	
198·6	187·0	+19·3	
199·6	187·1	+19·5	
200·5	186·2*	+19·8*	
201·6	185·8	+19·9	
203·5	185·2	+20·0	(near limb.)

Second rotation. 789.

at 219·6	. . 183·8	. . +19·2
221·5	. . 183·6	. . +19·4
222·6	. . 182·8	. . +19·5
223·5	. . 183·0	. . +19·5
226·5	. . 182·4	. . +19·1
229·5	. . 181·8	. . +19·0

The motions vary, and in latitude change sign, during

First rotation . . . Diurnal motions $-24'$ and $+4'$ . . . . for lat. $+19°$.
Second rotation . . . " " $-12'$ and $-3'$ . . . . " "

By comparison of mean places in the two rotations,

Diurnal motions result of $-11'$ and zero.

which is preferable as a conclusion.

764. Motion in longitude evidently positive, but the interruption of the observations preclude any numerical conclusions. See diagrams.

765. Seen twice only.

			Means.	
at 200·5	. . 150·9	. . −10·3		
	147·5	. . −10·1	. . 149·2	. . −10·2
201·6	. . 152·0	. . −10·6		
	147·7	. . −10·1	. . 149·8	. . −10·3

Diurnal motions $+33'$ and $+6'$ . . . . for lat. $-10°$.

767. Not capable of treatment. See diagrams.

768. Two separate outbreaks near together.

at 199·6	. . 119·9	. . + 9·6
200·5	. . —	. . —
201·6	. . —	. . —
203·5	. . 125·9	. . + 9·2
205·6	. . 125·7	. . + 9·5
206·6	. . 125·8	. . +10·0

Diurnal motions zero and $+12'$ . . . . for lat. $+10°$.

769. Probably a portion of 746 returned.

at 198·6	. . 115·7	. . −17·9
199·6	. . 116·0	. . −17·9
200·5	. . 115·3	. . −17·8
201·6	. . 115·1	. . −17·8
203·5	. . 115·1	. . −17·8
205·6	. . 114·8	. . −17·8
206·6	. . 114·5	. . −17·8

Diurnal motions $-8'$ and zero . . . . for lat. $-18°$.

770. The nucleus was double throughout, and the last observation indicated an approaching separation.

at 198·6	110·3	+17·2
199·6	110·5	+17·3
200·5	109·8	+17·1
201·6	109·7	+17·0
203·5	109·3	+17·0
205·6	109·2	+16·9
206·6	109·1	+16·8

The position of the principal or South nucleus was observed.

Diurnal motions −10′ and −3′ . . . . for lat. +17°.

771. It were to be wished that the observation on the 23d had been obtained; though there appears no doubt of the following being comparable:

at 203·5	100·1	−34·0
205·6	102·6	−33·6
206·6	103·2	−33·4

Whence diurnal motions +57′ and −12′ . . . . . for lat. −34°.

It is possible that this large positive motion may be caused by divergence: for on July 22nd the drawing shows three dots close together, and on the 24th one is first traced at a distance of about 3 degrees. The motion in longitude would appear to be exceptional in any case.

772. Two dots on the 22nd, which the position of one on the 24th indicates had a mutual action on one another. Accordingly not comparable.

773. See 749 and 796, and the diagrams given. Such groups as these require the application of photography in a climate where a continuous series of pictures can be obtained with certainty. The eye and hand can only indicate the sort of changes which might be so registered.

775. See 751.

776. The portion in lat. +24° is treated under 752. The portion in lat. +20° is a new addition too near the former, and too little observed to be dwelt upon further.

777. See 753. The two principal spots may be discussed separately.

A. . . .	at 203·5	34·1	−15·7
	205·6	33·0	−15·7
	206·6	33·3	−15·7
	211·5	33·5	−14·8
	213·7	33·5	−14·4

Diurnal motions zero and −10′ . . . for lat. −15°.

B. . . . at 205·6	. .	22·6	. .	−16·9	
206·6	. .	23·0	. .	−17·4	
211·5	. .	22·6	. .	−17·5	
213·7	. .	22·2	. .	−17·0	

Diurnal motions −4′ and +1′ . . . . for lat. −17°.

778. The break in the record is again very prejudicial. I think it best to take the observations two and two:

at 205·6	. .	5·6	. .	+ 5·1
206·6	. .	7·0	. .	+ 5·5

Indicating diurnal motions +80′ and +24′ . . . . for lat. +5°.

Next as a double group

						Means.		
at 211·5	. .	9·5	. .	+ 5·9				
		2·2	. .	+ 6·3	. .	5·8	. .	+ 6·1
213·7	. .	10·0	. .	+ 6·0				
		3·0*	. .	+ 6·4*	. .	6·5	. .	+ 6·2

Whence diurnal motions +20′ and + 3′ . . . . for lat. +6°.

Take as result +30′ and +10′ . . . . for lat. +6°.

779. See 754 and 803.

781. The portion in +15° had apparently begun to break up when first seen. I should have expected the principal nucleus in long. 328° to have come on again, but it does not, and therefore I do not work out its apparent motion. The following spot, normal in form, though near, seems quite independent of the main group.

at 211·5	. .	307·1	. .	+ 9·7
213·7	. .	307·7	. .	+10·1
216·5	. .	307·7	. .	+ 9·9
217·6	. .	308·3	. .	+ 9·6
219·6	. .	308·4	. .	+10·1

Diurnal motions +8′ and zero . . . . for lat. +10°.

783, 785 and 786, are sufficiently near to one another to throw doubt on any deduced motions. 783 might be supposed to correspond to 807, but I think it safer to take that spot by itself. The great group 785 returns as 809 much diminished, but during its second rotation again increases to be a very considerable area of disturbance. 786 recurs as 813, and the principal nuclei may be compared. It will be noticed that 813 exhibits a fresh formation in the course of its progress.

787. I assume that the small spot following may be neglected.

at 219·6	. .	214·4	. .	+ 7·7
221·5	. .	214·6	. .	+ 7·8
222·6	. .	214·3	. .	+ 7·8

223·5	. . 214·1	. . + 7·8	
226·5	. . 214·1	. . + 7·9	

Diurnal motions $-5'$ and $+2'$ . . . . for lat. $+8°$.

788. One-half of this group is defective and the motion cannot be deduced in consequence.

789. See 762, of which it is the second appearance.

790. Disappeared before it had half crossed the disk.

at 219·6	. . 176·9	. . −26·2
221·5	. . 175·2	. . −26·4
222·6	. . 174·8	. . −26·5
223·5	. . 174·4	. . −26·5

Diurnal motions $-30'$ and $+4'$ . . . . for lat. $-26°$.

792, 815 and 839. During the first rotation, I treat this, a double group, as follows:

			Means.	
at 221·5	. . 162·3	. . +17·2		
	152·9	. . +14·1	. . 157·6	. . +15·6
222·6	. . 162·4	. . +16·8		
	152·7	. . +14·2	. . 157·6	. . +15·5
223·5	. . 163·0	. . +17·1		
	153·0	. . +14·0	. . 158·0	. . +15·6
226·5	. . 163·1	. . +16·9		
	152·1	. . +14·0	. . 157·6	. . +15·5
229·5	. . 162·7	. . +16·5		
	151·0	. . +14·3	. . 156·8	. . +15·4

Whence diurnal motions $-6'$ and $-1'$ . . . . for lat. $+16°$.

Next compare the positions of the spot which recurs.

First rotation, 792.

at 226·5	. . 152·1	. . +14·0	
229·5	. . 151·0	. . +14·3	
232·5	. . 150·5	. . +14·6	

Second rotation, 815.

at 248·5	. . 150·0	. . +15·2
250·6	. . 149·1	. . +14·9
254·4	. . 149·0	. . +14·9
255·4	. . 148·1	. . +14·8
256·5	. . 148·0	. . +14·9
257·4	. . 148·4	. . +14·6
258·5	. . 148·0	. . +15·2

Third rotation, 839.

at 276·5	. . 149·3	. . +15·0	(omit)
277·5	. . 147·9	. . +14·9	

279·5	147·4	+14·9
281·4	146·8	+14·7
282·6	146·3	+14·7

Replacing these series by the following means, we have

at 229·5	151·2	+14·3
254·5	148·7	+14·9
280·2	147·1	+14·8

From the first and second rotation

Diurnal motions −6′ and +1′ . . . . for lat. +15°.

From the second and third rotation

Diurnal motions −4′ and zero . . . . for lat. +15°.

We may take for the whole, as of great weight,

Diurnal motions −5′ and zero . . . . for lat. +15°.

793. Compare the following positions.

at 223·5	137·7	−23·2
226·5	137·0	−23·1
229·5	136·3	−23·4

Diurnal motions −14′ and +2′ . . . . for lat. −23°.

796. Probably the remains of 773. The three places may be compared as follows:

at 229·5	64·8	−19·6
232·5	64·6	−19·4
233·5	64·8	−19·3

It is doubtful, from the subdividing of the nucleus, whether the observations relate to the same point.

797. Five comparable observations. Rapid motion.

at 229·5	67·4	+31·4	
232·5	64·6	+31·7	
233·5	63·8	+31·3	
238·5	60·1	+31·2	
239·5	60·2	+31·2	(near the limb.)

Diurnal motions −50′ and −4′ . . . . for lat. +31°.

799. See 752, under which I am inclined to think the following should be included as a third appearance.

at 229·5	37·6	+24·3
232·5	37·5	+24·5
233·5	37·4	+24·5
238·5	36·8	+24·7
239·5	37·0	+24·7
240·6	37·2	+24·6

Whence diurnal motions −4′ and +2′ . . . . for lat. +25°.

The diagrams show two fresh formations during this rotation in long. 47° by +20°.

800 and 823 are hardly the same, but must belong to the same group. The only comparable positions belong to 823.

at	257·4	37·9	−33·6
	258·5	35·9	−33·7

The first of these is too near the limb for accuracy, and the motion is exaggerated and worthless.

803. See 754 and 779, and in the next rotation 828.

First take 803 by itself.

at	238·5	334·1	+27·9	
	239·5	333·3	+28·0	
	240·6	332·7	+28·1	
	241·6	332·0	+27·7	
	242·7	331·5	+27·4	
	243·5	331·5	+27·2	
	244·6	330·6	+27·6	
	245·4	330·2	+27·2	
	246·5	329·8	+27·4	(near the limb.)

Whence diurnal motions −31′ and −4′ . . . . for lat. +28°.

The observations of 828 are but two comparable

at	264·5	327·2	+26·4
	267·4	326·1	+27·6
and perhaps	273·4	323·3	+26·4

The following will be the approximate mean positions in the successive rotations:

First rotation	at 184·5	359·5	+27·0
Second ,,	212·5	347·2	+26·2
Third ,,	240·5	332·7	+28·0
Fourth ,,	268·5	325·5	+26·6

The extremes of which show a retrograde motion of 34 degrees in 84 days, or a rate of −24′ per day in longitude throughout, which was less at first in consequence of divergence. The actual motion is probably very accurately deduced from the second and third rotations, and may be taken to have been

−30′ and zero′ . . . . for lat. +27°.

807. See 783. The series is all but perfect.

at	239·5	263·6	−18·6	(near the limb.)
	240·6	263·1	−18·7	
	241·6	262·9	−18·7	
	242·7	262·9	−18·5	
	243·5	263·0	−18·5	
	244·6	262·7	−18·3	

245·4	262·5	−18·4
246·5	262·3	−18·4
247·5	262·0	−18·2
248·5	261·7	−18·3
250·6	261·4	−18·4

The form of the spot may be considered as normal throughout.

Diurnal motions −10′ and −3′ . . . . for lat. −18°.

808. A neat detached normal spot.

at 240·6	253·1	+14·8	(near the limb.)
241·6	253·3	+14·8	
242·7	253·4	+15·0	
243·5	253·8	+14·9	
244·6	254·1	+15·1	
245·4	254·4	+15·0	
246·5	254·6	+14·8	

Diurnal motions +20′ and +2′ . . . . for lat. +15°.

809. The second appearance of 785. See 835 and 853. The area disturbed was again very extensive.

810. The diagrams indicate a variable motion in longitude. Numerical treatment is not possible.

811 and 834 must, I think, be the same spot. During the first rotation the divergence is large and the motion deceptive. When the companion has fairly disappeared the normal motion is shown. A curved trajectory is the result.

811 . . at	245·4	226·4	−11·1
	246·5	227·9	−10·7
	247·5	228·7	−10·7
	248·5	229·2	−10·8
	250·6	229·1	−10·4
834 . . at	273·4	233·2	−11·8
	275·4	232·7	−11·5
	276·5	233·1	−11·8
	277·5	232·5	−11·9
	279·5	232·3	−12·4

I conclude diurnal motions −10′ and +6′ . . . . for lat. −12°.

812. A well defined dot.

at 243·5	223·1	−3·7
244·6	223·2	−3·3
245·4	223·2	−3·4

Diurnal motions zero and −8′ . . . . for lat. −3°.

813. I first write down four observations of 786, which it must be remembered are probably affected by irregular action of the neighbouring group.

786 . .	at 221·5	. . 227·6 . .	−22·7
	222·6	. . 227·2 . .	−22·8
	223·5	. . 226·5 . .	−22·5
	226·5	. . 224·1 . .	−22·3

Then 813 the next rotation alone.

at 243·5	. . 221·8 . .	−22·6
244·6	. . 221·1 . .	−22·3
245·4	. . 220·3 . .	−22·4
246·5	. . 219·3 . .	−22·2
247·5	. . 219·1 . .	−21·8

Diurnal motions −18′ and −1′ . . . . for lat. −22°.
by both rotations. By the second −40′ and −9′ . . . . „ . . „ .

814. A neat circular normal spot.

at 246·5	. . 172·2 . .	+14·4	(near the limb.)
247·5	. . 172·2 . .	+14·3	
248·5	. . 172·7 . .	+14·3	
250·6	. . 172·4 . .	+14·4	
254·4	. . 173·1 . .	+15·5	
255·4	. . 173·3 . .	+14·9	
256·5	. . 173·5 . .	+15·0	
257·4	. . 173·9 . .	+14·9	
258·5	. . 173·0 . .	+15·3	(near the limb.)

Diurnal motions +8′ and +7′ . . . . for lat. +15°.

815 is treated under 792. See also 839.

816 and 840 may be compared throughout.

Of 816 we have

at 254·4	. . 134·2 . .	+22·8
255·4	. . 133·5 . .	+22·9
256·5	. . 133·3 . .	+22·8
257·4	. . 133·6 . .	+22·6
258·5	. . 132·9 . .	+22·8

and of 840 the following:

at 276·5	. . 134·6 . .	+22·2	(near the limb.)
277·5	. . 130·1 . .	+21·8	
279·5	. . 129·8 . .	+21·4	
281·5	. . 129·4 . .	+21·2	
282·6	. . 128·9 . .	+21·4	

285·5	128·0	+21·6
287·6	127·4	+21·9
289·7	126·5	+22·1

By comparison of the two rotations result

Diurnal motions −11′ and −3′ . . . . for lat. +22°.

By the second alone I find

Diurnal motions −16′ and +3′ . . . . for lat. +22°.

And I conclude we must take as final the values −14′ and zero.

817. A small group, which we must treat as follows:

			Means.	
at 255·4	116·4	+10·4		
	114·0*	+ 9·8*	115·2	+10·1
256·5	117·0	+10·8		
	113·6*	+ 9·6*	115·3	+10·2
257·4	118·0	+10·8		
	113·1	+ 9·6	115·5	+10·2

Diurnal motions +9′ and +3′ . . . . for lat. +10°.

818. A dot. The first observation seems to belong to a different one in same latitude. See figures.

at 254·4	91·7	+12·1	(omit.)
255·4	90·1	+12·5	
256·5	91·4	+12·6	
257·4	92·7	+12·5	
258·5	93·1	+12·6	

Taking the last four observations as of the same point:

Diurnal motions +36′ and zero . . . . for lat. +12°.

821. The two observations are at too great an interval of time to be safely compared.

822. The same difficulty occurs again here.

823. See 800.

825. Two observations, admitting of precision.

at 264·5	24·2	+27·1
267·4	23·5	+27·8

Diurnal motions −14′ and +14′ . . . . for lat. +27°.

827. Also two observations only.

at 264·5	346·5	−12·3
267·4	346·5	−11·7

Diurnal motions zero and −12′ . . . . for lat. −12°.

828. See 803.

829. The spot seems to have been ill-defined at the second observation.

at 264·5	324·2	−20·9
267·4	322·6	−21·6

Diurnal motions −34′ and +12′ . . . . for lat. −21°.

830. A spot of normal form.

at 264·5	325·4	− 8·4
267·4	325·0	− 8·2
273·4	326·9	− 8·1

Diurnal motions +14′ and −2′ . . . . for lat. −8°.

831. A dot precedes, the influence of which cannot be estimated, and the observations are otherwise unfavourable.

832. This spot first coalesces from a double form and then fairly divides anew. The motions appear small, but the observations do not admit of exact statement.

834. See 811.

835 and 853. See also 785 and 809. The form of 809 in the second rotation was very irregular. I therefore estimate the following general position on Sept. 4th from the diagrams.

Second rotation	at 247·5	240·	−24·5
Third rotation	at 273·4	228·5	−25·9
	275·5	228·0	−25·5
	276·5	227·7	−25·4
	277·5	226·8	−25·3
	279·5	225·5	−25·5
	281·4	225·0	−25·9
Fourth rotation	at 297·6	220·5	−27·0
	301·4	217·0	−27·8
	302·5	216·1	−27·7
	303·5	215·5	−27·7
	305·5	213·8	−27·8

I also extract some observations of 873.

Fifth rotation (?)	at 326·5	202·5	−26·3
	331·4	200·4	−25·1
	332·6	200·4	−25·1
	335·5	199·9	−24·7

The mean positions will be nearly the following:

at 247·5	240·	−24·5
275·5	227·8	−25·6

303·5 . . 215·4 . . −27·8
331·5 . . 200·4 . . −25·1

The last or supposed fifth rotation most probably belongs to the same spot, but not strictly to the same nucleus. The second, third and fourth rotations concur in giving

Diurnal motions −26′ and +4′ . . . . for lat. −26°.

and it will be noticed particularly that we have here a total movement over 42 degrees.

836. A normal spot of moderate size divides in two. On consideration of the diagrams and particular points observed, it appears that the only way of deducing the motion correctly in this instance, is by comparing the single position of Sept. 30th with the mean of the two nuclei of October 6th.

Thus at 273·4 . . 201·7 . . −26·4
279·5 . . 197·4* . . −26·8*

Whence diurnal motions −43′ and +4′ . . . . for lat. −26°.

838. The second and third observation can alone be compared.

			Means.	
at 279·5	167·5	+11·6		
	161·7	+11·3	164·6	+11·5
281·4	168·2	+11·4		
	162·0	+12·0	165·1	+11·7

Diurnal motions +15′ and +6′ . . . . for lat. +12°.

839. Two groups of which one has been treated of under 792. The second affords four comparable positions, and probably forms part of 858 in the next rotation.

B. at 281·4 . . 137·5 . . +10·1
282·6 . . 137·0 . . +10·0
285·5 . . 136·7 . . +10·1
287·6 . . 136·8 . . +10·3

Diurnal motions −7′ and +4′ . . . . for lat. +10°.

840. See 816.

842. New group on the site of 817. Inspection of the projected drawings shows that the right-hand portion retains nearly the same position throughout its considerable change of structure. The motions of the group may accordingly be taken as half those of the principal nucleus on the left.

at 279·5 . . 121·7 . . +11·5
281·4 . . 123·3 . . + 9·8
282·6 . . 124·4 . . +10·0
285·5 . . 126·6 . . +10·3
287·6 . . 126·3 . . + 9·9 for the nucleus.

I compare the following as mean places:

at 281·5 . . 123·4 . . +10·1
286·5 . . 126·5 . . +10·1

Motions of the spot about +37′ and zero . . . . in lat. +10°.
Diurnal motions of the group +18′ and zero . . . . for lat. +11°.

843. Only two days' observations are comparable.

			Means.	
at 287·6	57·3	+16·1		
	52·7	+16·3	55·0	+16·2
289·7	58·1	+16·6		
	52·2	+16·4	55·2	+16·5

Diurnal motions +6′ and +9′ . . . . for lat. +16°.

844. I regard this as three distinct groups.

A. lying between 33° and 46° of longitude. I think the following observations will give true motions of the spot they relate to.

at 285·5	39·5	−15·1
287·6	39·0	−14·8
289·7	37·9	−14·9
290·5	37·4	−15·1
292·5	37·3	−15·4
293·4	37·0	−15·6
295·5	36·7	−15·3

Whence diurnal motions −18′ and +5′ . . . . for lat. −15°.

B. The great mass in longitude 25°, which appears to be represented by 865, the next rotation, but which is unfitted for numerical treatment.

C. A normal circular spot as follows:

at 289·7	9·9	− 8·3
290·5	9·9	− 8·5
292·5	10·6	− 8·7
293·4	10·6	− 8·7
295·5	10·6	− 8·3

Of which diurnal motions +10′ and +3′ . . . for lat. −8°.

847. A well defined dot.

at 290·5	336·0	+30·7
292·5	337·4	+30·4

I suspect the longitudes.

848. Refer to the diagrams. Two spots near together but still separated, coalesce and are contained within a considerably extended penumbra, which afterwards again divides, and we have finally the two detached spots at about 3 degrees distance apart. Notice the rotation (left-handed in the diagram) of the line of direction joining the two centres. The figures give a rotation of about 4 degrees per diem. The drifts may be inferred from the following adopted mean positions.

at 292·5	318·5	−15·5
301·5	316·5	−16·0

Diurnal motions −13′ and +3′ . . . . for lat. −16°.

850. The interval between the first and second observation is too great for safe comparison.

851. Two groups. The first a normal spot.

A. . . . at	295·5	264·8	−9·4
	297·6	265·4	−9·4
	301·4	267·4	−8·9
	302·5	268·0	−9·2

Diurnal motions +28′ and +5′ . . . . for lat. −9°.

B. The observations do not admit of treatment.

852. It will be noticed that the scattered portion on the right-hand side which is lost on Nov. 1st is afterwards reformed, and the principal spot on the left increased in extent. The drift is evidently large and may be inferred from the adopted means.

at 301·5	230·2*	+15·4*
307·5	236·0*	+16·4*

Diurnal motions +60′ and +10′. . . . for lat. +16°.

853. See 835.

854. This group had better be discussed in two sets of four observations each.

				Means.	
1.	at 301·5	211·3	−2·8		
		203·3	−3·3	207·3	−3·0
	302·5	211·3	−2·7		
		203·0	−3·4	207·2	−3·0
	303·5	211·2	−2·8		
		203·3	−3·1	207·3	−3·0
	305·5	210·9	−2·7		
		203·8	−3·5	207·3	−3·1

Indicating no motion whatever . . . . for lat. −3°.

				Means.	
2.	at 305·5	217·7	−2·8		
		210·9	−2·6	214·3	−2·7
	306·5	218·4	−3·0		
		210·6	−2·7	214·5	−2·8
	307·5	218·7	−2·9		
		210·1	−2·5	214·4	−2·7
	308·5	219·3	−2·9		
		210·3	−3·0	214·8	−2·9
	309·5	too near the limb.			

Also indicating no motions . . . . for lat. −3°.

Probably the best set of observations so near the Equator.

855 and 873 B. I take these to be the same spot.

First rotation . .	at 308·5	194·9	−19·9
	309·5	193·7	−19·5

Second rotation	at 331·4	192·0	−20·3
	332·6	191·7	−20·4
	335·5	190·8	−20·2
	336·5	190·9	−20·3

By comparison of the two rotations there result

Diurnal motions −7′ and +1′ . . . . for lat. −20°.

858. I think the three principal components of this correspond respectively with 839 and 842 of the previous rotation, and 877 of the next. I write the observed positions separately, as these spots exhibit no mutual action.

	A.		B.	
at 305·5	138·9	+11·9	128·8	+10·0
306·5	138·9	+11·9	128·8	+ 9·9
307·5	138·4	+12·2	128·5	+ 9·9
308·5	138·6	+12·0	129·2	+ 9·7
309·5	138·3	+12·1	128·8	+10·4
313·6	——	——	128·8	+10·2

C.

at 307·5	140·2	+8·0
308·5	140·6	+7·9
309·5	140·6	+8·2
313·6	139·3	+8·7

The last observation of C is opposed to its identity with 877. With respect to A and B it may be more correct to remark that the motions of 839 and 842 are shown by the above observations to be arrested. These two spots concurrently give

Diurnal motions −4′ and +4′ . . . for lat. +11°.

859. Compare 841. See diagrams.

860. May be two groups, but I treat it as one.

			Means.	
at 309·5	135·3	+24·0		
	125·4	+28·0	130·4	+26·0
313·6	136·5	+23·5		
	124·9	+27·4	130·7	+25·5

Diurnal motions +5′ and −7′ . . . . for lat. +26°.

862. Insufficiently observed for any discussion.

864 Probably two groups. Neither admit of discussion. See diagrams and group 884.

865. I take the Southern spot in long. 24° by −16° to be the remains of the principal spot 844 B, but do not venture to record the result of comparison. Neither do I think the observations of the present rotation can be safely discussed in presence of the

large spot in lat. —10° so near to it. It is more worth notice to observe the left-handed rotation of the line joining these nuclear centres. Notice 886, another group here, the next rotation.

866. First with a penumbra and then without. But the observation on Nov. 11th is either faulty or of another one.

at 319·5	359·8	−18·2
320·5	359·8	−18·3
322·5	359·2	−18·4

Diurnal motions −12′ and +4′ . . . . for lat. −18°.

867. A normal circular spot.

at 315·6	345·5	−7·9
319·5	345·0	−8·1
320·5	344·6	−7·9
322·5	344·9	−8·4
323·5	344·7	−8·6
326·5	344·0	−9·1

Whence diurnal motions −5′ and +7′ . . . . for lat. −8°.

868, 889 and 908. We seem to have the very first dot of this group, the development and divergence of which was terminated on the fifth day of appearance. And as the "following" component rapidly disappeared I direct attention to the "preceding" one only.

First rotation	at 322·5	339·2	+11·2	
	323·5	339·5	+11·1	
	326·5	339·6	+10·9	
Second rotation	at 343·5	339·3	+10·8	
	344·5	340·0	+10·7	
	349·5	340·8	+10·9	
	351·6	340·4	+10·9	
	352·5	340·1	+10·9	
	353·5	340·3	+10·9	
	354·5	339·6	+10·8	(near the limb.)
Third rotation	at 370·5	342·3	+11·1	
	371·6	341·9	+11·3	
	372·5	342·2	+11·5	
	373·5	342·6	+11·6	

Taking mean places.

at 324·2	339·4	+11·1
350·3	340·3	+10·9
372·2	342·3	+11·4

The positive motion in longitude increases from 2′ to 6′

Take diurnal motions +4′ and zero . . . . for lat. +11°.

869. See diagrams. Principal spot taken.

at 319·5 . .	299·9 . .	+21·4
320·5 . .	297·5 . .	+21·6
322·5 . .	297·5 . .	+21·4
323·5 . .	296·5 . .	+21·4
326·5 . .	296·4 . .	+21·1
331·4 . .	295·0 . .	+21·5 (near the limb.)

Diurnal motions −27′ and −3′ . . . . for lat. +21°.

871. A group 893 follows, in the position of the dots which precede in long. 265°. The observations are

at 322·5 . .	255·2 . .	−21·0
323·5 . .	254·9 . .	−21·0
326·5 . .	253·5 . .	−20·7
331·4 . .	251·5 . .	−20·0
332·6 . .	251·5 . .	−20·3

Diurnal motions −22′ and −5′ . . . . for lat. −21°.

872. Normal spot observed as follows:

at 326·5 . .	213·2 . .	− 9·7
331·4 . .	213·8 . .	− 9·6
332·6 . .	213·5 . .	− 9·8
335·5 . .	212·6 . .	− 9·7
336·5 . .	212·8 . .	− 9·9

Diurnal motions −3′ and zero . . . . for lat. −10°.

873. The spot in lat. −20° is 855, which see. The southern spot was observed as follows:

at 331·4 . .	200·4 . .	−25·1
332·6 . .	200·4 . .	−25·1
335·5 . .	199·9 . .	−24·7

Diurnal motions −9′ and −7′ . . . . for lat. −25°.

874. There are three groups under this number, as the diagrams show. No discussion is possible. See 859.

875. Very similar to 874 C above it.

			Means.	
at 331·4 . .	195·9 . .	+11·3		
	191·2 . .	+12·1 . .	193·6 . .	+11·7
332·6 . .	197·9 . .	+10·2		
	190·3 . .	+12·2 . .	194·1 . .	+11·2
335·5 . .	199·2 . .	+10·4		
	191·0 . .	+12·5 . .	195·1 . .	+11·4
336·5 . .	199·8 . .	+10·6		
	191·7 . .	+12·8 . .	195·8 . .	+11·7

Diurnal motions +24′ and zero . . for lat. +11°.

(876). A dot nearly on the Equator.

	at 331·4	163·1	−0·5
	332·6	163·3	−0·4

Diurnal motions +10′ and −6′ . . . . for lat. −0°.

876. Two groups, principally dots.

877 and 899. I do not transcribe all the observations, but guided by the diagrams take the following:

877	at 335·5	143·7	+8·1
	336·5	144·1	+8·0
	.	.	.
899	at 360·5	145·4	+8·0
	366·5	146·2	+8·4

Diurnal motions +4′ and +1′ . . . . for lat. +8°.

880 and 903. The change and division of the large nucleus probably invalidate conclusions of motion in latitude.

880	at 335·5	99·1	+7·5	
	336·5	100·2	+7·5	
	343·5	100·3	+6·5	
	344·5	100·2	+6·1	
903	at 366·5	102·2	+5·7	
	367·5	102·3	+5·7	
	368·6	102·8	+5·9	
	370·5	102·3	+5·3	
	371·6	101·7	+5·3	(near the limb.)

Say diurnal motions +5′ and −3′ . . . . for lat. +7°.

882. A spot of which more observations would have been desirable.

at 335·5	90·5	−4·0
336·5	91·2	−3·9

Diurnal motions +42′ and −6′ . . . . for lat. −4°.

884. Better taken by itself, but see 864.

at 336·5	66·3	+25·1
343·5	63·3	+25·6
344·5	63·1	+25·6

Say diurnal motions −20′ and +4′ . . . . for lat. +25°.

885. Only two observations, and I cannot estimate the effect of the numerous dots which "follow."

886 and 905. It may be a question whether this is a repetition or redevelopment of 844. If comparison of positions in this case be possible, it must be that of the following means.

886	at 344·5	34·0	−18·0
905	366·5	32·2	−16·8

Which give diurnal motions −5′ and −3′ . . . . for lat. −18°.

887. I write the spots separately, and take the mean of the motions for the mean position.

	A		B	
at 343·5	349·8	+31·2		
344·5	350·1	+31·3	339·9	+33·0
349·5	348·5	+31·4	335·2	+34·2
351·6	——	——	333·9	+34·7
352·5	——	——	333·5	+34·9

Mean diurnal motions −30′ and +8′ . . . . for lat. +33°.

889. See 868 and 908.

890. A normal circular spot, as follows:

at 344·5	319·6	+7·5	(near the limb.)
349·5	321·0	+7·3	
351·6	321·3	+7·0	
352·5	321·6	+7·1	
353·5	321·7	+7·3	
354·5	321·4	+7·3	

Diurnal motions +8′ and zero . . . . for lat. +7°.

892. The right-hand component is imperfectly developed and wanting in the third observation. On the indication of the two first I deduce the motion of the group in longitude from half that of the other spot.

Spot . . .	at 353·5	264·0	−7·3
	354·5	265·8	−7·2
	358·6	268·0	−7·9

Say diurnal motions of group +20′ and +8′ . . . . for lat. −7°.

893. I think the following may be compared. See figures.

at 353·5	262·9	−15·4
354·5	263·9	−15·4
358·6	263·0	−15·4
360·5	263·5	−15·1

Diurnal motions −2′ and −2′ . . . . for lat. −15°.

894. On reference to the diagrams, it will be seen that first one and then the other principal spot divided into two distinct nuclear spots of normal form. The observations are not suitable for determination of motions.

896. Three observations admitting of comparison.

			Means.	
at 354·5	207·4	+13·3		
	198·0	+15·9	202·7	+14·6
358·6	210·9	+12·2		
	199·7	+15·6	205·3	+13·9
360·5	211·5	+12·7		
	200·2	+16·0	205·9	+14·3

Diurnal motions +35′ and −6′ . . . . for lat. +14°.

897. Normal spot observed twice only.

at 358·6	182·0	−23·4
360·5	181·9	−23·5

Diurnal motions −3′ and +3′ . . . . for lat. −23°.

898. See 876 and 912. Too imperfect to compare.

899. See 877.

901. See 914. No comparison possible.

903. See 880.

904. Three small groups of varying dots.

905. See 886. The three last observations also afford an independent result for drift.

			Means.	
at 6·6	39·5	−17·0		
	31·8	−16·6	35·6	−16·8
7·5	40·0	−17·5		
	31·4	−16·7	35·7	−17·1
8·5	40·6	−17·7		
	31·3	−17·1	36·0	−17·4

Diurnal motions +12′ and +18′ . . . . for lat. −17°.

907. The motions cannot be unobjectionably deduced.

908. See 868. Of the second group only one observation.

909. Neglecting possible action of the dots following:

at 8·5	294·1	−11·3
15·5	293·6	−10·5

Diurnal motions −4′ and −6′ . . . . for lat. −11°.

911 and 925 B. A spot of unusual duration nearly under the equator. See figures.

911 . .	at 15·5 . .	206·0 . .	− 1·0	
	25·5 . .	205·8 . .	− 0·7	
	26·5 . .	204·2 . .	− 1·1	(near the limb.)

At the next rotation

925 B .	at 42·5 . .	209·3 . .	− 2·0
	47·5 . .	207·9 . .	− 2·7

It is improbable that two such similar spots so similarly situated in so rare a position should not be the same, and yet the observed motions are clearly opposed to their identity, and it is most unusual for a spot on the equator to remain visible beyond three or four days. It seems preferable to suppose them different and treat them separately, on the greater probability of the case being one of repetition or renewal of outbreak. In which case

Diurnal motions — 4′ and zero . . . . for lat. −1°.
by 925 B . . . —— −17′ and +9′ . . . . for lat. −2°.

913. Too large and irregular for accurate definition.

914. Taking the mean of the extreme positions

			Means.	
at 25·5 . .	155·3 . .	− 9·3		
	143·5 . .	−13·0 . .	149·4 . .	−11·2
26·5 . .	156·9 . .	− 9·3		
	143·1 . .	−13·2 . .	150·0 . .	−11·2
27·5 . .	158·1 . .	− 9·8		
	142·9 . .	−13·6 . .	150·5 . .	−11·7
28·5 . .	158·3 . .	− 9·4		
	142·7 . .	−13·1 . .	150·5 . .	−11·2

Diurnal motions +24′ and +6′ . . . . for lat. −11°.

915. Three groups, all insignificant. One appears to be the precursor of a considerable group recorded in the next rotation as 932.

916. See diagrams. Comparisons impracticable.

919. Two different spots. The second must be referred to 936 of the next rotation.

920 to 923. Too fragmentary for discussion.

924. Rather too large and undefined for accuracy.

at 40·6 . .	246·6 . .	+13·1
42·5 . .	246·4 . .	+13·4
47·5 . .	245·0 . .	+13·7

Diurnal motions −14′ and +5′ . . . . for lat. +13°.

925. A group A and detached spot B. The principal spot of A is too much altered in the interval between the two observations for comparison. See 911 in reference to B.

926. The following are the only observations.

at 42·5	216·1	+7·9
47·5	215·6	+8·3

Whence diurnal motions $-6'$ and $+5'$ . . . . for lat. $+8°$.

927 and 944. A well defined oval spot, but with dots infesting the neighbourhood.

First rotation.

at 40·6	220·5	−25·4
42·5	219·6	−25·6
47·5	216·2	−26·8

Second rotation.

at 69·5	208·9	−25·8
70·6	206·9	−25·5
71·6	208·6*	−25·8
72·5	206·0	−25·1
73·5	205·2	−25·3

Diurnal motions $-26'$ and zero . . . . for lat. $-26°$.

928. Two groups, but only once observed.

930. Again, two groups. The second probably the same as 950, which see.

931. A normal spot. The first observation, however, on which the motion much depends, taken near the limb.

at 47·5	141·7	−22·5
56·4	134·2	−23·7
57·5	134·0	−23·3
58·5	133·6	−23·9

Say diurnal motions $-24'$ and $+6'$ . . . . for lat. $-24°$.

932. Unsuited for numerical treatment. See 915 and 951.

936. A detached spot A and two groups B and C which trench on one another. I compare A with the second appearance numbered 919.

919 . . .	at 37·6	42·5	+8·1
936A . . .	56·4	48·2	+7·0
	57·5	48·7	+6·9
	58·5	48·6	+7·0

Diurnal motions $+18'$ and $-3'$ . . . . for lat. $+8°$.

The two groups are too entangled for discussion.

937. The last three observations of the small spot which survives the group might perhaps be compared, but the result would not be beyond objection.

938. I reject the two first observations. The following observations were made on the "preceding" spot of the two, which will not affect the result, as the distance appears to have remained unchanged throughout.

at 65·5 . .	321·5 . .	−21·1
67·4 . .	321·5 . .	−21·1
68·5 . .	321·3 . .	−20·8
69·5 . .	320·9 . .	−21·4
70·6 . .	321·7 . .	−21·3
71·6 . .	321·6 . .	−20·9

Diurnal motions zero and +4′ . . . . for lat. −21°.

939. A renewed outbreak in the region of 922.

			Means.	
at 68·5 . .	313·0 . .	−10·4		
	310·4* . .	−12·0 . .	311·7 . .	−11·2
69·5 . .	314·8 . .	−10·5		
	309·4* . .	−12·1 . .	312·1 . .	−11·3
70·6 . .	315·8 . .	−10·1		
	308·5 . .	−12·5 . .	312·2 . .	−11·3
71·6 . .	317·0 . .	−10·1		
	308·2 . .	−12·3 . .	312·6 . .	−11·2

Diurnal motions +15′ and zero . . . . for lat. −11°.

940. The circular spot shows very rapid motion.

at 67·4 . .	288·9 . .	−6·7	
68·5 . .	290·7 . .	−6·6	
69·5 . .	292·2 . .	−7·6	(no error but bad.)
70·6 . .	294·4 . .	−6·0	

Diurnal motions +108′ and −3′ . . . . for lat. −7°.

A second outbreak occurs, but the form is not definite enough for observations to fix the motion.

941. I pass over the first observation, and at the same time point out that the general direction of the group rotates right-handedly, and that the first observation is material to the evidence.

			Means.	
at 69·5 . .	281·5 . .	+12·1		
	274·2 . .	+13·0 . .	277·9 . .	+12·6
70·6 . .	282·3 . .	+12·5		
	274·2 . .	+12·7 . .	278·2 . .	+12·6
71·6 . .	282·6 . .	+12·8		
	275·7 . .	+12·4 . .	279·1 . .	+12·6

72·4 . . 283·0 . . +12·8
275·4 . . +12·9 . . 279·2 . . +12·8
73·5 . . 282·9 . . +12·6
275·5 . . +11·7 . . 279·2 . . +12·2
Diurnal motions +24′ and zero . . . . for lat. +13°.

942. Some traces of a group follow the main spot.

at 67·4 . . 241·8 . . −11·2
68·5 . . 241·8 . . −11·3
69·5 . . 241·8 . . −11·2
Diurnal motions zero and zero . . . . for lat. −11°.

943. Observed twice only.

at 72·4 . . 225·7 . . +20·3 Means.
222·3 . . +19·2 . . 224·0 . . +19·7
73·5 . . 226·9 . . +20·1
221·2 . . +19·6 . . 224·0 . . +19·8
Diurnal motions zero and +6′ . . . . for lat. +20°.

944. A and B. A is treated under 927. For B I find the following. Spot small and circular.

at 70·6 . . 200·1 . . −20·3
71·6 . . 199·5 . . −20·3
72·4 . . 199·2 . . −20·2
73·5 . . 198·6 . . −20·8
Diurnal motions −27′ and +6′ . . . . for lat. −20°.

946. There are dots following the principal spot.

at 70·6 . . 195·4 . . −9·4
71·6 . . 194·4 . . −9·0
72·4 . . 195·4 . . −8·5
73·5 . . 196·0 . . −8·4
76·4 . . 196·8 . . −8·9
79·4 . . 197·5 . . −9·9
80·4 . . 198·0 . . −9·4
Diurnal motions +19′ and +5′ . . . . for lat. −9°.

947. Two separate groups. Cannot discuss either.

949. Large circular normal spot.

at 73·5 . . 149·2 . . −12·0 (near the limb.)
76·4 . . 147·8 . . −12·6
79·4 . . 148·2 . . −12·6

80·4 . .	148·1 . .	−12·1
81·6 . .	148·0 . .	−11·8
82·4 . .	148·0 . .	−11·7

Diurnal motions −5′ and −6′ . . . . for lat. −12°.

950. Merely a plain dot.

at 76·4 . .	145·5 . .	+6·9
79·4 . .	145·8 . .	+6·5
80·4 . .	146·0 . .	+6·7

Diurnal motions +6′ and −4′ . . . . for lat. +7°.

951. See 932. The series is broken off after the fourth observation. A normal spot and a large group. First the spot A.

A . .	at 76·4 . .	115·8 . .	+19·0
	79·4 . .	114·4 . .	+19·1
	80·4 . .	114·3 . .	+18·9
	81·6 . .	113·7 . .	+19·2
	82·4 . .	113·4 . .	+19·2

Diurnal motions −22′ and zero . . . . for lat. +19°.

B . . The group of three nuclear spots.

			Means.	
at 79·4 . .	97·7 . .	+14·0		
	84·0 . .	+15·1 . .	90·8 . .	+14·6
80·4 . .	99·6 . .	+14·9		
	84·2 . .	+15·3 . .	91·9 . .	+15·1
81·6 . .	100·4 . .	+15·4		
	83·5 . .	+15·8 . .	92·0 . .	+15·6
82·4 . .	100·4 . .	+15·4		
	82·8 . .	+16·2 . .	91·6 . .	+15·8

The observations are not unexceptionable. They give for

Diurnal motions +15′ and +24′ . . . . for lat. +15°.

952. A single dot, once seen nuclear.

at 79·4 . .	89·4 . .	−7·8
80·4 . .	89·7 . .	−7·9
81·6 . .	89·5 . .	−8·5
82·4 . .	89·8 . .	−8·4

Diurnal motions +3′ and +18′ . . . . for lat. −8°.

Before assembling the foregoing results for final discussion, I have to add one other observation from a foreign source, on account of the high latitude to which it relates. It was communicated to me by Professor Peters, of Hamilton College, Clinton, New

York, and was made by him at the Observatory at Naples in the year 1846. The spot observed was nuclear, and of a form generally round, and was followed first by one and then three small detached spots at some distance. From the observations sent me, by reduction with the elements used throughout for my own observations, I have found the following results, arranged as in the Table of Redhill observations.

Naples M.T.	Dist.	Pos.	Fr. Node.	H. Long.	H. Lat.
June 8^d . . 0^h 52^m	·9041	19° 32′	134° 20′	134° 20′	+50° 2′
„ 13 . . 0 26	·7799	339 32	199 42	129 2	+50 55

from which result

Diurnal motions −64′ and +11′ . . . for lat. +50°.

I know of no other spot reliably observed as yet in so high a latitude. The next in order appears to be my observation of a group in lat. 45° South, which will be found under No. 290.

I next extract and arrange in a table all the diurnal motions above deduced, placing them in order of latitude from North to South, and under each degree of latitude in order of date. The results are further written in three columns. In the first are placed all results of well-observed normal spots and of double rotations, in the second results of less but of tolerable average value, relation being had to the number of observations and the interval over which they extended, and in the third column results of decidedly inferior value.

TABLE OF RESULTING DIURNAL MOTIONS.

Lat.	Group.	I.		II.		III.	
+ 50°	Peters.					−64′	+11′
+ 37	236					−78	−30
	465					−55	− 4
+ 34	224	−42	+ 3				
	645			−48	+ 7		
+ 33	706			−36	+ 6		
	887			−30	+ 8		
+ 32	125			−30	− 2		
+ 31	135			−33	− 3		
	620					+12	− 6
	748	−30	+10				
	797			−50	− 4		
+ 30	209			−30	+ 3		
	453 , 478	−18	− 2				
+ 29	176			−18	+10		
	245					−42	0
	485			−50	+ 6		
+ 28	143					− 4	+24

Lat.	Group.	I.		II.		III.	
	171	−25	+20				
	264			−33	+ 6		
	520			−38	− 4		
	803	−31	− 4				
+ 27	779 , 803	−30	0				
	825			−14	+14		
+ 26	194			− 7	+ 7		
	241	−31	− 2				
	551 , 569	−20	+ 2				
	573 , 592	−10	− 4				
	779	−30	+ 1				
	860					+ 5	− 7
+ 25	799			− 4	+ 2		
	884			−20	+ 4		
+ 24	162 , 168	−10	0				
	168			−12	+12		
	254					−36	−12
	711	−20	+ 4				
+ 23	181			−20	+10		
	341 , 357	−24	0				
	519			−28	+ 5		
	752 , 776	−20	+ 5				
	816 , 840	−11	− 3				
+ 22	181 , 189	−12	− 3				
	199			−38	−12		
	581 , 598	− 2	− 1				
	608					−16	+ 1
	840	−16	+ 3				
+ 21	496 , 516	−16	0				
	516 , 535	−16	0				
	525			−14	− 6		
	670 , 692	− 7	+ 2				
	869			−27	− 3		
+ 20	174			− 6	+ 1		
	184			− 4	0		
	230					+24	0
	285			−12	− 7		
	497					−22	0
	648 , 670	− 9	0				
	687			− 5	−10		
	697	−15	+ 7				
	943					0	+ 6
+ 19	32 , 38	−13	+ 3				
	187			−12	+ 3		
	412			−16	+ 4		
	658	− 1	− 1				
	678					−36	+ 8
	722			+33	−27		
	762 , 789	−11	0				
	951	−22	0				
+ 18	425			−12	−12		
	457			−30	0		
	632			+25	+10		

Lat.	Group.	I.		II.		III.	
+ 17	27					+15	+ 6
	703					−18	+ 6
	723					−12	+ 3
	733			−13	− 2		
	770	−10	− 3				
+ 16	278			+ 8	− 8		
	471					+10	− 3
	757	−17	+ 3				
	792			− 6	− 1		
	843					+ 6	+ 9
	852					+60	+10
+ 15	646			+10	− 5		
	709			− 6	0		
	715			−14	−12		
	720			−15	+ 3		
	792 , 815	− 6	+ 1				
	815 , 839	− 4	0				
	808			+20	+ 2		
	814	+ 8	+ 7				
	951					+15	+24
+ 14	73			+ 9	− 4		
	248			− 9	0		
	577					− 6	+10
	582			− 3	+ 3		
	705					+12	−10
	691 , 712	− 3	− 3				
	712	−15	0				
	896			+35	− 6		
+ 13	278			+27	+15		
	318			−10	+ 2		
	408	−10	−8				
	466					+15	− 4
	488					0	+ 3
	673			− 6	− 6		
	755			− 4	+ 2		
	924			−14	+ 5		
	941			+24	0		
+ 12	2 , 7	+ 9	−6				
	11					+ 8	−16
	44			+18	+ 6		
	747			+36	− 6		
	818			+36	0		
	838					+15	+ 6
+ 11	117			+24	+ 2		
	751 , 775	− 2	−2				
	842			+18	0		
	858			− 4	+ 4		
	868 , 889	+ 4	0				
	889 , 908	+ 4	0				
	875			+24	0		
+ 10	50			+ 9	− 3		
	66	+ 4	−4				
	95					−12	−30

Lat.	Group.	I.		II.		III.	
	486			− 8	+ 6		
	768			0	+12		
	781			+ 8	0		
	817					+ 9	+ 3
	839			− 7	+ 4		
+ 9	7 , 15	+ 5	−10				
	29					+35	− 9
	91					+12	− 6
	508					+ 6	+ 8
+ 8	36					+ 4	− 6
	69	+ 8	+ 8				
	80					+13	− 4
	93					+27	0
	107	+12	− 8				
	491					+38	+20
	531 , 550	+13	+ 4				
	618			−11	− 1		
	725	+14	− 4				
	755					+12	− 6
	787			− 5	+ 2		
	877 , 899	+ 4	+ 1				
	926			− 6	+ 5		
	919 , 936	+18	− 3				
+ 7	25 , 31			+ 4	− 2		
	121	+ 4	− 1				
	218					0	+30
	396 , 407	+19	− 1				
	880 , 903	+ 5	− 3				
	890	+ 8	0				
	950	+ 6	− 4				
+ 6	58	+ 4	− 4				
	61					0	0
	114					+48	0
	553			+ 4	− 4		
	629			+16	+ 8		
	671			+30	− 7		
	778					+30	+10
+ 5	1			+21	− 4		
	99			+17	+17		
	778					+80	+24
+ 4	97			+10	+ 4		
	137			+13	+24		
	708			+22	−22		
+ 3	165			+38	− 2		
− 0	(876)					+10	− 6
− 1	911			+ 4	0		
− 2	925			−17	+ 9		
− 3	812					0	− 8
	854	0	0				
− 4	683			+ 6	− 3		
	882					+42	− 6

Lat.	Group.	I.		II.		III.	
− 5	659					+24	−12
− 6							
− 7	22					+30	+ 6
	92					+60	− 9
	442					+ 3	+ 3
	653 , 677	+10	− 1				
	892			+20	+ 8		
	940					+108	− 3
− 8	64					+20	0
	102					+36	+20
	123	+10	− 4				
	219					0	0
	500					+ 4	+ 6
	830			+14	− 2		
	844	+10	+ 3				
	867	− 5	+ 7				
	952			+ 3	+18		
− 9	86	+ 2	+ 1				
	281	+ 1	− 4				
	494					+12	+ 8
	622			+10	− 8		
	851	+28	+ 5				
	946	+19	+ 5				
− 10	297	+ 4	0				
	613					+30	+12
	765					+33	+ 6
	872	− 3	0				
− 11	57 , 59	+ 5	− 2				
	105					+16	− 6
	909			− 4	− 6		
	914			+24	+ 6		
	939			+15	0		
	942					0	0
− 12	6 , 14	+ 4	0				
	35					0	0
	113	+ 5	+ 5				
	268			+20	− 6		
	293			− 3	− 4		
	546					0	0
	579 , 613	0	0				
	701	+18	+ 4				
	710 , 730	− 3	+ 2				
	730 , 753	− 2	− 1				
	753 , 777	0	− 2				
	811 , 834	−10	+ 6				
	827					0	−12
	949	− 5	− 6				
− 13	459			+ 1	0		
− 14	291	− 4	− 1				
	439			0	− 2		
	440			− 7	− 3		
	479			0	0		
	568					− 2	− 4
	647					+ 8	− 8

Lat.	Group.	I.		II.		III.	
	674	− 6	0				
− 15	51	− 9	− 3				
	656			+ 9	− 2		
	749					− 3	+ 5
	777			0	−10		
	844	−18	+ 5				
	893			− 2	− 2		
− 16	297					+30	+24
	437					0	− 2
	494			−20	− 5		
	597			−13	− 8		
	739					+ 8	+ 1
	848			−13	+ 3		
− 17	177					−12	− 2
	182			+10	− 5		
	207	−10	0				
	208			− 5	− 3		
	306			− 9	+12		
	406			− 2	− 2		
	758	−21	+ 2				
	777			− 4	+ 1		
	905					+12	+18
− 18	250			+ 9	−12		
	649	− 6	+ 5				
	736					+34	+ 9
	769	− 8	0				
	807	−10	− 3				
	866			−12	+ 4		
	886 , 905	− 5	− 3				
− 19	201			−17	− 5		
	315 , 332	− 9	0				
	374			−15	+10		
	518			−14	+ 3		
	601			−29	− 1		
− 20	170	−16	+ 3				
	178			+15	0		
	260			+ 6	+ 4		
	267			+15	− 4		
	296	−24	+ 4				
	855 , 873	− 7	+ 1				
	944			−27	+ 6		
− 21	282					−30	+12
	293					− 3	+18
	296	−15	+ 1				
	295	−23	+ 7				
	829					−34	+12
	871			−22	− 5		
	938			0	+ 4		
− 22	146 , 157	− 8	0				
	157 , 161	−14	+ 1				
	166					−42	− 6
	231					0	0
	257					+6	+18
	269	−14	+ 3				

Lat.	Group.	I.		II.		III.	
	270					+ 6	− 6
	292	−15	− 4				
	679			− 3	0		
	702			+24	−15		
	721			−30	+ 7		
	760	−20	+ 2				
	786 , 813	−18	− 1				
	813			−40	− 9		
− 23	150					−30	+18
	193			−14	− 3		
	444					−31	+ 4
	793			−14	+ 2		
	897					− 3	+ 3
− 24	141					−10	0
	284					−21	− 6
	650	−24	+ 5				
	931			−24	+ 6		
− 25	124			− 5	+ 3		
	518			−28	+ 1		
	619			−28	+ 7		
	717					+55	−12
	809 , 835	−26	+ 4				
	835 , 853	−26	+ 4				
	873					− 9	− 7
− 26	336					−33	+ 6
	604					−17	− 8
	790			−30	+ 4		
	836			−43	+ 4		
	927 , 944	−26	0				
− 27	180	−40	0				
− 28	128			−24	+ 2		
	140			− 5	− 1		
	158			−60	+12		
	147			−30	+10		
	575	−40	− 3				
− 29	138	−24	+ 7				
	144			−30	0		
	173	−38	− 6				
	220 , 229	−36	+ 1				
	233			−50	+ 8		
	566					−58	+ 4
− 30	142					+14	+14
	526 , 547	−38	+ 2				
	728					−24	+15
− 32	564			−52	− 5		
− 33	249			−36	−10		
− 34	139	−44	+ 3				
	309			−78	−12		
	327			−62	− 4		
	771					+57	−12
− 36	132			−50	+ 6		
− 45	290			−92	− 8		

It is desirable in the next place to take approximate means of the above single results, in order to inspect the probable result of the inquiry, and judge of the further treatment required. I therefore conjecturally assign the weights 4 and 1 to the results in columns I and II. respectively, and in a first solution reject III. altogether. This treatment leads to the following table of approximate mean drifts. The sign + in latitude-motion indicates increasing latitude or motion towards the Pole in each hemisphere, as before stated.

Lat.	D. Motion.		Weight.	Lat.	D. Motion.		Weight.
	′	′			′	′	
+ 36°	—	—	—	− 36°	−50	+ 6	1
35	—	—	—	35	—	—	—
34	−43	+ 4	5	34	−41	− 1	7
33	−33	+ 7	2	33	−36	−10	1
32	−30	− 2	1	32	−52	− 5	1
31	−34	+ 5	6	31	—	—	—
+ 30	−20	− 1	5	− 30	−38	+ 2	4
29	−34	+ 8	2	29	−34	+ 1	14
28	−30	+ 6	10	28	−35	+ 1	8
27	−27	+ 3	5	27	−40	0	4
26	−22	− 0	17	26	−30	+ 1	6
25	−12	+ 3	2	25	−20	+ 3	12
24	−15	+ 3	9	24	−24	+ 5	5
23	−19	+ 2	14	23	−14	− 0	2
22	−12	− 1	13	22	−14	− 0	28
21	−14	− 0	14	21	−17	+ 3	10
+ 20	−10	+ 1	12	− 20	−11	+ 2	16
19	−10	− 1	19	19	−14	+ 1	8
18	− 6	− 1	3	18	− 5	− 1	19
17	−11	− 3	5	17	−10	+ 1	13
16	− 3	+ 1	7	16	−15	− 3	3
15	+ 0	+ 2	18	15	− 9	− 0	11
14	− 3	− 2	12	14	− 4	− 1	11
13	− 2	− 1	10	13	+ 1	0	1
12	+18	− 3	7	12	+ 1	+ 1	38
11	+ 5	− 0	16	11	+ 8	− 1	7
+ 10	+ 2	+ 0	9	− 10	+ 1	0	8
9	+ 5	−10	4	9	+12	+ 1	17
8	+ 9	− 0	27	8	+ 6	+ 3	14
7	+ 8	− 2	21	7	+14	+ 1	5
6	+ 9	− 3	7	6	—	—	—
5	+19	+ 6	2	5	—	—	—
4	+15	+ 2	3	4	+ 6	− 3	1
3	+38	− 2	1	3	0	0	4
2	—	—	—	2	−17	+ 9	1
1	—	—	—	1	− 4	0	1

Inspection of the foregoing table shows at once that the diurnal motions in longitude are subject to a well-marked law of variation depending on the latitude, while it is not apparent that the motions tabulated for the latitude are anything beyond the accidental differences of observation. Trial readily shows that no parabolic curve or expression of

the form a sin l or a $\sin^2 l$ will satisfy the above values; but that the whole table of results for longitude may very fairly be represented by the expression

$$+14' - 165' . \sin^{\frac{7}{4}} l$$

which expanded gives the following values:

Lat.	D. Motion.	Lat.	D. Motion.	Lat.	D. Motion.
°	′	°	′	°	′
± 36	− 51·1	± 24	− 20·2	± 12	+ 3·4
35	48·4	23	17·9	11	4·9
34	45·7	22	15·6	10	6·3
33	− 43·4	21	− 13·4	9	+ 7·6
32	40·3	20	11·2	8	8·8
31	37·6	19	9·1	7	9·9
30	35·0	18	− 7·1	6	10·9
29	32·4	17	5·2	5	11·7
28	29·9	16	3·3	4	+ 12·4
27	27·4	15	− 1·5	3	13·0
26	25·0	14	+ 0·2	2	13·6
± 25	− 22·6	± 13	+ 1·8	± 1	+ 14·0

It will be remembered that these values correspond to an assumed general period of Rotation of 25·380 mean solar days, or to a general Rotation of 14° 11′ per solar day, a value which is now shown to apply only to the latitude of 14° N. and S.

I now proceed to a more accurate discussion of the individual results first tabulated. The approximate solution first obtained affords the means of comparing each separate result of columns I. II. and III. with an approximate result derived from the whole, of averaging the differences and deriving the weights suitable to be employed. Having performed this operation, I have found that the mean error of a single result in column I. is 5′·5, whether derived from a single or from two rotations (confirming my previous belief, on which I ventured so to class them), that the mean error of results in column II. was 13′, and of III. was 16′. The proper weights to apply to the results of the three columns would accordingly be 33, 6 and 4 respectively, or 4, $\frac{3}{4}$ and $\frac{1}{2}$. It will be sufficiently near and more convenient to use the weights 10, 2 and 1. The mean errors which lead to this rule accordingly indicate that the results of column III. are not so inferior to those of column II. as I at first supposed, and that the provisional weights employed in combining the results of I. and II. were as nearly as possible correct. Were it not that the result under discussion is one of the chief objects of the present research, a repetition of the process performed above would be hardly worth the doing. However, to check the former result and employ all the data of observation, I form the following table with the weights just found.

Lat.	D. Motion.		Weight.	Lat.	D. Motion.		Weight.
+ 50°	−64′	+11′	1	− 45°	−92′	− 8′	2
. . .	. . .		. . .	. . .	. . .		. . .
+ 37	−66	−17	2	− 37	. . .		. . .
36	. . .		. . .	36	−50	+ 6	2
35	. . .		. . .	35	. . .		. . .
34	−43	+ 4	12	34	−44	− 1	15
33	−33	+ 7	4	33	−36	−10	2
32	−30	− 2	2	32	−52	− 5	2
31	−21	+ 5	15	31	. . .		. . .
+ 30	−20	− 1	12	− 30	−33	+ 4	12
29	−36	+ 6	5	29	−34	+ 1	35
28	−28	+ 8	25	28	−35	+ 1	18
27	−27	+ 2	12	27	−40	+ 0	10
26	−21	− 1	43	26	−27	+ 0	17
25	−12	+ 3	4	25	−20	+ 3	27
24	−16	+ 2	23	24	−23	+ 4	14
23	−19	+ 1	34	23	−17	+ 3	7
22	−12	− 1	33	22	−14	− 0	72
21	−14	+ 0	34	21	−18	+ 5	27
+ 20	− 9	+ 1	31	− 20	−12	+ 2	38
19	−11	− 0	47	19	−13	+ 1	18
18	− 6	− 1	6	18	− 6	− 0	45
17	− 9	− 1	15	17	−10	+ 1	32
16	− 5	+ 2	17	16	− 6	+ 0	9
15	− 0	+ 2	41	15	−10	− 0	27
14	− 4	− 1	30	14	− 4	− 1	28
13	− 2	− 2	24	13	+ 1	0	2
12	+16	− 4	18	12	+ 1	− 0	97
11	+ 5	− 0	38	11	+ 6	− 1	18
+ 10	+ 2	− 1	22	− 10	+ 3	+ 1	22
9	+ 8	− 8	13	9	+12	+ 1	43
8	+10	− 0	71	8	+ 6	+ 3	38
7	+ 8	− 1	53	7	+21	+ 0	16
6	+11	− 2	19	6	. . .		. . .
5	+31	+10	5	5	+24	−12	1
4	+15	+ 2	6	4	+18	− 4	3
3	+38	− 2	2	3	0	− 1	11
2	. . .		. . .	2	−17	+ 9	2
1	. . .		. . .	1	− 4	0	2
+ 0	. . .		. . .	− 0	+10	− 6	1

In the above table it will be remarked that there is more distinctly a trace of motion in latitude, the signs being on the whole + for latitudes higher N. or S. than 20°, though the daily polar motion between 20° and 40° of latitude on an average does not exceed 2′, a quantity which could only be deduced from the totality of a large number of single results. Between the parallels of 10° to 20° the motion in latitude is evidently very small; but the signs are generally negative and a feeble tendency towards the Equator of about 1′ per diem is indicated. Within 10° of the Equator on either side no reliable motion in latitude appears to exist, the signs varying much and the mean results being

of less weight. It may however be inferred from these conclusions that elements of rotation will be best based on observed differences of latitude between about 8 and 18 degrees of latitude in either hemisphere, pairing them together in sets of two, one North and one South.

We cannot for the motion in longitude do better than compare the above revised table with the expanded table of the expression

$$+14' - 165'. \sin^{\frac{7}{4}} l.$$

using the latter as a normal curve, and determine a series of equidistant normal errors, with due regard to the weights.

MEAN NORMAL ERRORS IN LONGITUDE.

Lat.	E.	Wt.	W. × E.	Mean W. & E.		Lat.	E.	Wt.	W. × E.	Mean W. & E.	
+37°	−12′	2	−24′			−37°	—′	—	—′		
36	—	—	—			36	+ 1	2	+ 2		
+35	—	—	—	18	+3′·0	−35	—	—	—	19	+2′·4
34	+ 3	12	+ 36			34	+ 2	15	+ 30		
33	+10	4	+ 40			33	+ 7	2	+ 14		
32	+10	2	+ 20			32	−12	2	− 24		
31	+17	15	+255			31	—		—		
+30	+15	12	+180	59	+8·0	−30	+ 2	12	+ 24	67	−2·4
29	− 4	5	− 20			29	− 2	35	− 70		
28	+ 2	25	+ 50			28	− 5	18	− 90		
27	0	12	—			27	−13	10	−130		
26	+ 4	43	+172			26	− 2	17	− 34		
+25	+11	4	+ 44	116	+2·4	−25	+ 3	27	+ 81	75	−1·6
24	+ 4	23	+ 92			24	− 3	14	− 42		
23	− 1	34	− 34			23	+ 1	7	+ 7		
22	+ 4	33	+132			22	+ 2	72	+144		
21	− 1	34	− 34			21	− 5	27	−135		
+20	+ 2	31	+ 62	151	+0·5	−20	− 1	38	− 38	200	−0·4
19	− 2	47	− 94			19	− 4	18	− 72		
18	+ 1	6	+ 6			18	+ 1	45	+ 45		
17	− 4	15	− 60			17	− 5	32	−160		
16	− 2	17	− 34			16	− 3	9	− 27		
+15	+ 2	41	+ 82	127	−1·8	−15	− 8	27	−216	98	−5·0
14	− 4	30	−120			14	− 4	28	−112		
13	− 4	24	− 96			13	− 1	2	− 2		
12	+13	18	+234			12	− 2	97	−194		
11	0	38	0			11	+ 1	18	+ 18		
+10	− 4	22	− 88	142	+1·5	−10	− 3	22	− 66	218	−0·9
9	0	13	0			9	+ 4	43	+172		
8	+ 1	71	+ 71			8	− 3	38	−114		

Lat.	E.	Wt.	W. × E.	Mean W. & E.	Lat.	E.	Wt.	W. × E.	Mean W. & E.
7°	− 2′	53	−106′		7°	+11′	16	+176′	
6	0	19	0		6	—	—	—	
+ 5	+19	5	+ 95	85 +0′·6	− 5	+12	1	+ 12	31 +2′·4
4	+ 3	6	+ 18		4	+ 6	3	+ 18	
3	+25	2	+ 50		3	−13	11	−132	
2	—	—	—		2	− 3	2	− 6	
1	—	—	—		1	+10	2	+ 20	
+ 0	—	—	—	.. ..	− 0	− 4	1	− 4	5 +2·0

We are now able to concentrate the results of observation in the following table, which is entirely independent of the expression used as temporary normal curve.

ROTATION OF THE SOLAR SURFACE IN DIFFERENT LATITUDES IN ONE MEAN SOLAR DAY.

Lat.	Rot. per diem.		Rotation.	Weight.	A	B
+ 50°	851′	−64′	= 787′	1		
35		−45	806	18	−3′	−1′
+ 30		−27	824	59	−8	−5
25		−20	831	116	−2	0
+ 20		−11	840	151	−0	+2
15		0	851	127	−2	0
+ 10		+ 8	859	142	−2	0
5		+12	863	85	−1	0
Equator.		+16	867	5	−2	−2
− 5		+14	865	31	−2	−3
− 10		+ 5	856	218	+1	0
15		− 6	845	98	+5	+3
− 20		−12	839	200	+0	−1
25		−24	827	75	+2	−1
− 30		−37	814	67	+2	−1
35		−46	805	19	−2	−5
− 45	·851	−92	= 759	2		

In column A I have exhibited the residual errors of the empirical solution

$$865' \mp 165'. \sin^{\frac{7}{4}} l. \quad . \quad . \quad . \quad . \quad . \quad . \quad A$$

and in column B, those of the expression

$$865' \mp 165'. \sin^{\frac{7}{4}} (l - 1^\circ) \quad . \quad . \quad . \quad B$$

The errors are on the whole reduced by the additional assumption that the Equator of equal parallel rotation differs by 1 degree from the true Equator, and the solution is probably as good numerically as it is possible to find one, and very closely represents the total results of observation.

Respecting expression A, in which it is assumed that the motions are equal at equal distances from the Equator North or South, it has further to be remarked that the assumed constant 865′ requires no sensible correction, the sum of the + errors multiplied by their weights being sensibly equal to that of the − errors similarly multiplied by their respective weights.

In the last place, as the results for motion in longitude are sufficiently numerous, I have thought it desirable to divide the whole into two portions, and to institute for each hemisphere a comparison of the motions of groups before number 400 with those after. The mean difference for each hemisphere has been calculated by the following formula.*

If a_1 be the mean motion and m_1 its weight for groups before 400 of any one degree of latitude, b_1 the mean motion and n_1 the weight for the groups after 400 of the same degree of latitude, the weight of $(b_1 - a_1)$ the difference between the mean motions before and after 400 of that degree is $\frac{m_1 \cdot n_1}{m_1 + n_1}$, and the mean difference for all the observed latitudes is

$$\frac{(b_1 - a_1) \cdot \frac{m_1 \cdot n_1}{m_1 + n_1} + (b_2 - a_2) \cdot \frac{m_2 \cdot n_2}{m_2 + n_2} + \text{etc.}}{\frac{m_1 \cdot n_1}{m_1 + n_1} + \frac{m_2 \cdot n_2}{m_2 + n_2} + \text{etc.}}$$

with weight the same as the denominator.

In this manner I have found for the North Hemisphere the difference + 0′·94 with weight 114, and for the South Hemisphere the mean difference −2′·7 with weight 92: and therefore for the two combined — 0′·7 with weight 207. The quantity is too small to be regarded as anything but a necessary conclusion of a numerical process, and the signs come out opposed for the two hemispheres. Still I state the result of the examination, such as it is.

* For which I am indebted to Prof. De Morgan.

SECTION IV.

INVESTIGATION OF THE CORRECTIONS REQUIRED BY THE ASSUMED ELEMENTS OF POSITION OF THE SUN'S POLE.

HAVING no doubt from the commencement of this work that the elements adopted for provisional use, namely,

$$I = 7^{\circ}.\ 10', \qquad \text{and } N = 74^{\circ}.\ 30', \qquad \text{for } 1854{\cdot}0,$$

were very nearly correct, I have never contemplated the necessity of starting anew with every satisfactory series of observations as a fresh basis for founding a set of elements upon; but I have throughout expected that a proper treatment of a large number of series carefully selected from the stock, would lead me by a suitable differential method to a final correction of the elements on which some considerable reliance might be placed.

It is not easy to assure oneself, in examining the grounds on which previous elements rest, that the precaution has been taken of rejecting as unsuitable data spots of abnormal form, changing figure, or the components of groups. The frequent instances given in preceding pages of this work of the mutual action of parts of groups, whether large or small, and inspection of the plates of illustration, will supersede the necessity of specially pointing out why in selecting data for the correction of the assumed position of the Pole, it is indispensable to exercise a certain discrimination, and as nearly as possible confine oneself to continuous series of small well-defined single circular nuclear spots, such as Nos. 180, 194, 207, 291, 478, &c. If single dots, such as No. 59, without penumbra, were frequent and of sufficient duration, they would be still preferable as offering more definite centres for observation, but these objects rarely remain visible for more than two or three days; and the same consideration induces one to include some normal spots of larger size than a fastidious choice would approve, because they have the advantage of greater permanence over the very small ones. In endeavouring on the one hand to retain all admissible data, and to reject all groups affected by internal mutual actions, I find the following 86 series of observations alone remain out of the whole number observed. The numbers are recopied here, partly for convenience of reference, partly because a reader could not without reference to my original memoranda

in all cases select the proper spot, partly because the longitudes from the Node are here required as data, and partly because in a few cases a small correction has been made in the latitude for an estimated amount (indicated by an asterisk) of observed change of form.

Group.	Day.	Longitude.	Latitude.
		° ′	° ′
32	94·55	74. 55	+17. 47
	95·57	88. 37	+18. 13
	97·51	115. 18	+18. 20
38	121·57	91. 44	+19. 10
	123·54	119. 34	+19. 8
	128·55	188. 28	+19. 41
50	172·59	142. 10	+10. 45
	173·52	155. 34	+10. 23
	174·53	169. 33	+10. 23*
	175·54	184. 4	+10. 26
	176·51	197. 46	+10. 24
	177·52	212. 21	+10. 22
	178·54	226. 54	+10. 17
	179·54	241. 50	+10. 8
	180·56	256. 22	+10. 16
51	172·59	129. 48	−14. 28
	173·52	143. 18	−14. 43
	174·53	157. 26	−14. 52
	175·54	171. 27	−14. 56
	176·51	185. 15	−14. 39
	177·52	199. 26	−14. 40
	178·53	213. 23	−14. 42*
	179·54	228. 23	−14. 25
	180·56	241. 32	−14. 13
	182·56	269. 17	−13. 41
57	209·57	164. 42	−11. 40
	210·52	178. 37	−11. 30
	212·50	207. 2	−11. 12
	213·55	221. 42	−11. 5
	217·59	278. 46	−10. 56
	218·52	292. 3	−10. 42
	219·53	305. 34	−10. 26
58	219·53	162. 30	+ 6. 32
	221·50	190. 43	+ 6. 33
	222·54	205. 39	+ 6. 25
	224·52	234. 3	+ 6. 3
	225·49	247. 51	+ 6. 9
	227·57	277. 16	+ 5. 48
	229·61	306. 15	+ 5. 50
	230·47	318. 25	+ 5. 50
	231·50	333. 44	+ 5. 49
59	236·51	189. 24	−10. 14
	237·53	203. 23	−10. 20
	238·56	218. 10	−10. 3
	239·53	231. 56	−10. 13
	240·53	246. 19	−10. 23
	241·52	260. 29	−10. 23
	242·55	275. 6	−10. 19
	243·52	288. 54	−10. 8
66	269·54	231. 41	+10. 26
	270·56	246. 12	+10. 24
	271·55	260. 26	+10. 13
	272·56	274. 48	+10. 14
	273·52	288. 29	+10. 11
	274·51	302. 44	+10. 28
69	303·48	268. 9	+ 7. 48
	304·51	282. 54	+ 7. 47
	306·49	311. 16	+ 8. 4
	309·52	354. 41	+ 8. 45
	312·48	37. 0	+ 9. 6
86	64·52	11. 58	9. 9
	65·49	25. 40	− 9. 0
	70·53	97. 7	− 9. 21
	71·53	111. 19	− 9. 21
	74·50	154. 7	− 9. 4
107	296·56	262. 37	+ 8. 0
	299·54	305. 50	+ 7. 22
	300·54	320. 9	+ 7. 4
	304·51	16. 55	+ 7. 0
113	100·57	64. 5	−11. 21
	106·46	148. 39	−12. 23
	107·51	163. 26	−12. 19
	108·51	177. 48	−12. 30
	109·64	193. 44	−12. 19
	110·53	206. 14	−12. 19
140	42·51	5. 35	−28. 0
	45·52	48. 3	−27. 45
	46·51	62. 10	−27. 51
	47·58	77. 7	−27. 54
157	145·52	89. 56	−21. 41

Group.	Day.	Longitude.	Latitude.	Group.	Day.	Longitude.	Latitude.
		° ′	° ′			° ′	° ′
	146·50	103. 26	−21. 25	187	274·48	210. 56	+18. 59
	147·54	117. 58	−21. 26		277·51	252. 3	+18. 57
	149·51	145. 44	−21. 29		278·45	265. 2	+19. 0
	151·50	173. 21	−21. 49		282·47	321. 38	+18. 47
	152·67	189. 15	−21. 53		285·50	3. 34	+19. 18
	153·58	202. 12	−21. 50		286·47	17. 18	+19. 29
	154·51	214. 42	−21. 49				
	155·51	228. 35	−21. 36	189	277·51	216. 0	+21. 27
	157·66	257. 31	−21. 11		278·45	229. 27	+21. 20
					282·47	285. 2	+21. 2
161	173·52	121. 29	−21. 19		285·50	326. 19	+20. 57
	174·53	134. 35	−21. 28		286·47	339. 51	+21. 21
	175·53	148. 23	−21. 52		288·51	11. 37	+21. 25
	176·42	160. 35	−21. 53				
	177·65	176. 48	−22. 3	194	288·51	245. 43	+25. 35
	178·51	188. 41	−22. 6		289·50	259. 13	+25. 49
	179·67	204. 40	−22. 17		291·59	288. 11	+25. 53
					292·57	302. 14	+26. 0
170	223·66	188. 27	−20. 9		295·55	344. 17	+26. 12
	224·56	201. 12	−20. 15		296·48	357. 30	+26. 29
	225·58	215. 0	−20. 36		298·47	25. 7	+26. 45
	227·49	241. 27	−20. 31				
	228·45	255. 7	−20. 42	207	322·62	273. 26	−16. 17
	229·49	269. 40	−20. 33		325·62	315. 51	−17. 0
	230·53	283. 53	−20. 24		328·50	356. 30	−17. 0
					330·51	24. 37	−16. 51
171	223·66	186. 18	+27. 29		331·51	38. 35	−16. 59
	224·56	198. 28	+27. 31				
	225·58	212. 19	+27. 40	208	337·49	333. 7	−17. 5
	227·49	238. 51	+28. 18		338·51	347. 30	−16. 42
	228·45	251. 57	+28. 21		341·49	29. 26	−16. 41
	229·49	266. 19	+28. 29				
	230·53	280. 22	+28. 23	209	337·49	323. 0	+29. 29
					338·51	336. 56	+29. 51
173	233·50	177. 23	−28. 59		341·49	17. 38	+29. 45
	234·50	191. 55	−28. 38				
	235·46	204. 39	−28. 31	267	129·50	83. 32	−20. 8
	236·53	219. 7	−28. 44		132·52	127. 48	−19. 29
	237·51	232. 41	−28. 56		135·58	171. 47	−19. 25
	238·55	247. 25	−29. 8		137·63	200. 46	−19. 25
	239·51	259. 52	−29. 4				
	241·50	286. 50	−28. 38	281	162·51	125. 42	− 9. 51
	242·50	300. 15	−28. 17		163·52	140. 6	− 9. 32
	243·51	313. 54	−27. 57		164·52	154. 7	− 9. 31
	244·57	328. 12	−27. 50		165·52	168. 19	− 9. 17
					166·53	182. 42	− 8. 57
180	252·45	223. 11	−26. 31		169·53	225. 43	− 8. 48
	255·52	264. 46	−26. 51		171·57	254. 17	− 8. 54
	256·67	280. 18	−26. 27		172·54	267. 55	− 8. 51
	258·50	305. 5	−26. 34				
	259·49	318. 28	−26. 41	291	176·55	129. 28	−13. 44
	260·41	330. 39	−26. 44		177·62	143. 27	−13. 47
					179·51	170. 2	−14. 13

Group.	Day.	Longitude.	Latitude.
		° ′	° ′
	180·61	185. 42	−14. 9
	181·66	200. 16	−14. 10
	182·68	214. 47	−14. 6
	184·53	241. 4	−13. 48
	186·49	268. 24	−14. 2
296	188·65	153. 30	−19. 35
	191·48	195. 8	−19. 32
	192·55	209. 37	−19. 33
	194·51	236. 25	−19. 41
	195·52	250. 32	−19. 55
	197·52	278. 41	−20. 8
297	188·65	139. 52	− 9. 52
	191·48	179. 42	− 9. 42
	192·55	194. 58	− 9. 54
	194·51	223. 8	− 9. 45
	195·52	237. 21	−10. 0
	197·52	265. 56	− 9. 49
408	61·68	64. 47	+13. 45
	64·51	105. 7	+13. 10
	66·52	133. 6	+12. 58
	67·49	146. 4	+12. 37
	68·63	162. 51	+13. 3
440	124·48	95. 1	−14. 9
	127·51	137. 41	−14. 1
	131·54	194. 20	−13. 46
453	145·54	106. 2	+30. 38
	155·65	243. 23	+29. 58
478	173·60	133. 1	+30. 9
	176·56	173. 23	+29. 30
	180·51	226. 53	+28. 33
	183·53	267. 12	+28. 36
459	155·65	127. 49	−12. 37
	159·56	183. 26	−12. 42
	162·52	225. 33	−12. 32
486	187·54	148. 20	+10. 7
	188·55	161. 59	+10. 12
	190·60	190. 30	+10. 0
	197·55	288. 35	+10. 57
575	316·54	271. 31	−28. 26
	320·46	324. 3	−28. 15*
	323·51	5. 34	−27. 52
	327·54	60. 19	−27. 59
582	323·51	291. 42	+14. 1
	327·54	348. 44	+14. 16
	330·48	30. 15	+14. 24
592	344·52	329. 53	+25. 24
	348·55	26. 40	+24. 43
	351·52	68. 36	+24. 17
597	348·55	314. 29	−16. 19
	351·52	355. 35	−15. 56
	355·49	51. 23	−15. 24
598	348·55	291. 17	+21. 36
	351·52	331. 29	+22. 6
	355·49	26. 30	+22. 2
	360·54	94. 18	+22. 5
612	6·47	326. 52	+10. 16
	10·46	22. 50	+10. 40
	15·48	94. 50	+10. 51
	16·48	109. 36	+11. 9
619	15·48	336. 6	−24. 24
	16·48	350. 32	−24. 23
	18·55	18. 42	−24. 43
	21·46	58. 22	−25. 1
	22·50	72. 34	−25. 10
	23·47	86. 5	−25. 16
632	29·59	8. 13	+17. 56
	31·50	36. 8	+18. 13
	32·50	50. 44	+18. 22
650	50·43	354. 11	−24. 5
	52·58	24. 23	−24. 1
	53·54	37. 46	−23. 54
	54·49	50. 24	−24. 7
	57·50	92. 2	−24. 17
	59·50	118. 50	−24. 59
	60·58	134. 29	−24. 27
	61·64	149. 43	−24. 35
653	57·50	23. 9	− 6. 47
	59·50	50. 58	− 6. 57
	60·58	66. 52	− 6. 51
	61·64	81. 22	− 7. 5
	64·44	121. 24	− 6. 29
	65·46	136. 6	− 6. 19
	67·62	165. 57	− 6. 28
677A	83·57	36. 16	− 6. 25
	84·47	48. 52	− 6. 28
	85·45	62. 58	− 6. 37

Group.	Day.	Longitude.	Latitude.
		° ′	° ′
658	64·44	28. 42	+18. 29
	65·46	43. 6	+18. 50
	67·62	73. 54	+18. 57
	69·52	101. 4	+18. 57
	72·45	141. 58	+18. 26
	74·49	170. 40	+18. 32
709	122·53	81. 47	+15. 52
	123·66	96. 55	+15. 36
	124·50	109. 8	+15. 21
	125·49	122. 33	+15. 6
	126·55	137. 56	+15. 14
	127·49	151. 9	+14. 47
720	140·45	119. 3	+15. 19
	141·46	133. 34	+15. 9
	142·45	147. 14	+14. 51
	143·56	163. 1	+15. 11
	144·58	177. 24	+15. 32
725	142·45	86. 46	+ 7. 58
	143·56	100. 56	+ 7. 55
	144·58	116. 5	+ 8. 14
	147·50	158. 16	+ 7. 44
	150·38	199. 22	+ 7. 47
730	150·38	112. 28	−12. 36 ?
	156·36	196. 2	−12. 29
	157·55	212. 22	−12. 47
	159·53	239. 55	−12. 48
753	176·62	121. 34	−13. 4
	177·34	133. 19	−12. 46
	182·58	206. 48	−12. 15
	184·56	234. 30	−12. 31
	185·53	248. 11	−12. 26
	187·72	278. 56	−12. 13
747	173·50	156. 48	+11. 54
	176·62	203. 2	+11. 27
	177·34	213. 42	+11. 33
749	173·50	136. 17	−15. 0
	176·62	180. 4	−15. 28
	177·34	190. 32	−15. 19
760	185·53	135. 25	−22. 12
	187·72	165. 49	−22. 12
	189·58	192. 14	−22. 15
	190·54	205. 9	−22. 32
	192·63	234. 11	−22. 28
	193·71	249. 22	−22. 29
	194·48	259. 28	−22. 37

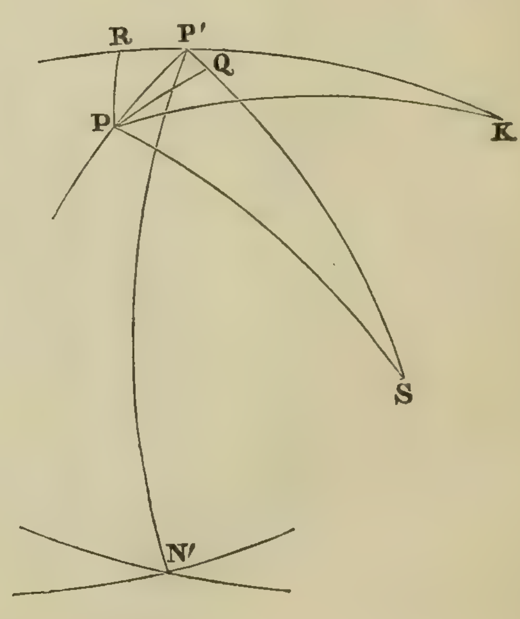
Group.	Day.	Longitude.	Latitude.
		° ′	° ′
770	198·55	164. 38	+17. 13
	199·65	180. 16	+17. 17
	200·53	192. 13	+17. 5
	201·56	206. 45	+17. 2
	203·49	233. 42	+16. 58
	205·63	263. 58	+16. 53
	206·64	278. 13	+16. 48
775	201·56	140. 5	+10. 51
	203·49	167. 50	+10. 45
	205·63	197. 40	+10. 58
	206·64	212. 1	+10. 58
	211·55	281. 25	+11. 18
	213·66	311. 11	+11. 28
777 *a*	203·49	158. 32	−15. 42
	205·63	187. 45	−15. 42
	206·64	202. 21	−15. 39
	211·55	272. 11	−14. 47
	213·66	302. 14	−14. 21
777 *b*	205·63	177. 21	−16. 51
	206·64	192. 8	−17. 25
	211·55	261. 16	−17. 32
	213·66	290. 57	−17. 0
787	219·63	207. 46	+ 7. 39
	221·55	235. 11	+ 7. 48
	222·59	249. 36	+ 7. 49
	223·52	262. 35	+ 7. 48
	226·49	304. 39	+ 7. 51
789	219·63	177. 9	+19. 13
	221·55	204. 9	+19. 27
	222·59	218. 9	+19. 27
	223·52	231. 32	+19. 29
	226·49	272. 55	+19. 5
	229·49	314. 59	+19. 1
792	221·55	173. 30	+14. 6
	222·59	188. 4	+14. 9
	223·52	201. 32	+14. 2
	226·49	242. 38	+13. 58
	229·49	284. 11	+14. 19
	232·48	326. 7	+14. 38
797	229·49	200. 34	+31. 23
	232·48	240. 13	+31. 42
	233·52	254. 8	+31. 20
	238·51	321. 15	+31. 11
	239·52	335. 38	+31. 15
799	229·49	170. 50	+24. 18

Group.	Day.	Longitude.	Latitude.
		° ′	° ′
	232·48	213. 9	+24. 28
	233·52	227. 46	+24. 28
	238·51	297. 56	+24. 44
	239·52	312. 23	+24. 45
	240·57	327. 30	+24. 33
807	239·52	178. 58	−18. 35
	240·57	193. 21	−18. 42
	241·57	207. 25	−18. 43
	242·67	223. 2	−18. 32
	243·53	235. 18	−18. 28
	244·56	249. 42	−18. 19
	245·45	261. 58	−18. 24
	246·50	276. 48	−18. 24
	247·53	290. 59	−18. 14
	248·48	304. 15	−18. 16
	250·56	333. 27	−18. 24
808	240·57	183. 23	+14. 49
	241·57	197. 53	+14. 50
	242·67	213. 29	+15. 1
	243·53	226. 8	+14. 56
	244·56	241. 5	+15. 5
	245·45	253. 55	+14. 57
	246·50	269. 5	+14. 50
	248·48	291. 29	+15. 42
811	245·45	225. 52	−11. 7
	246·50	242. 25	−10. 42
	247·53	257. 43	−10. 41
	248·48	271. 44	−10. 50
	250·56	301. 7	−10. 26
834	273·44	269. 50	−11. 45
	275·45	297. 47	−11. 31
	276·51	313. 8	−11. 50
	277·46	326. 3	−11. 53
	279·53	355. 18	−12. 22
814	246·50	186. 43	+14. 22
	247·53	201. 11	+14. 21
	248·48	215. 16	+14. 18
	250·56	244. 26	+14. 24
	254·42	299. 53	+15. 32
	255·42	314. 20	+14. 56
	256·46	329. 13	+15. 2
	257·44	343. 29	+14. 56
	258·49	357. 34	+15. 21
815	248·48	192. 35	+15. 12
	250·56	221. 9	+14. 53
	254·42	275. 49	+14. 54
	255·42	289. 8	+14. 47

Group.	Day.	Longitude.	Latitude.
		° ′	° ′
	256·46	303. 42	+14. 56
	257·44	318. 1	+14. 36
	258·49	332. 34	+15. 14
830	264·45	234. 33	− 8. 22
	267·45	276. 33	− 8. 10
	273·44	3. 31	− 8. 7
839	275·45	215. 43	+15. 7
	276·51	229. 26	+15. 1
	277·46	241. 26	+14. 55
	279·53	270. 27	+14. 55
	281·40	296. 17	+14. 39
	282·60	312. 49	+14. 40
840	276·51	214. 39	+22. 14
	277·46	223. 37	+21. 50
	279·53	252. 48	+21. 25
	281·40	278. 54	+21. 10
	282·60	295. 23	+21. 23
	285·51	335. 48	+21. 36
	287·64	5. 22	+21. 52
	289·66	33. 12	+22. 7
851	295·45	253. 36	− 9. 26
	297·59	284. 28	− 9. 21
	301·45	341. 18	− 8. 53
	302·45	356. 7	− 9. 14
867	315·59	259. 57	− 7. 56
	319·52	315. 7	− 8. 5
	320·52	328. 57	− 7. 52
	322·48	357. 7	− 8. 25
	323·46	10. 45	− 8. 35
	326·48	52. 53	− 9. 7
871	322·48	267. 24	−20. 59
	323·46	280. 57	−21. 1
	326·48	322. 22	−20. 41
	331·40	30. 11	−20. 1
	332·58	46. 55	−20. 20
872	326·48	282. 4	− 9. 44
	331·40	352. 30	− 9. 34
	332·58	8. 58	− 9. 46
	335·52	49. 43	− 9. 41
	336·54	64. 29	− 9. 54
873*a*	326·48	271. 23	−26. 17
	331·40	339. 3	−25. 8
	332·58	355. 52	−25. 4
	335·52	37. 4	−24. 39

Group.	Day.	Longitude.	Latitude.	Group.	Day.	Longitude.	Latitude.
		° ′	° ′			° ′	° ′
873*b*	331·40	330. 38	−20. 17		352·50	39. 39	+ 7. 9
	332·58	347. 6	−20. 22		353·51	54. 0	+ 7. 16
	335·52	27. 56	−20. 13		354·50	67. 47	+ 7. 20
	336·54	42. 36	−20. 17				
				903	1·54	33. 36	+ 5. 43
884	336·54	278. 0	+25. 8		2·53	47. 43	+ 5. 40
	343·50	13. 35	+25. 39		3·58	63. 2	+ 5. 54
	344·48	27. 17	+25. 37		5·49	89. 42	+ 5. 16
					6·60	104. 44	+ 5. 18
889	343·50	289. 39	+10. 49				
	344·48	304. 13	+10. 44	949	73·48	20. 58	−12. 1
	349·49	16. 5	+10. 55		76·45	61. 36	−12. 35
	351·60	45. 39	+10. 52		79·45	104. 37	−12. 38
	352·50	58. 11	+10. 56		80·44	118. 36	−12. 5
	353·51	72. 34	+10. 54		81·62	135. 34	−11. 46
	354·50	85. 59	+10. 49		82·42	146. 39	−11. 41
890	344·48	283. 46	+ 7. 30	950	76·45	59. 23	+ 6. 54
	349·49	356. 16	+ 7. 18		79·45	102. 14	+ 6. 30
	351·60	26. 36	+ 6. 58		80·44	116. 33	+ 6. 44

It does not require much consideration to see that the effect of a moderate error of position of the Pole as assumed in the reduction, will chiefly be felt in the latitudes, while the deduced longitudes will be affected by a very small and nearly constant amount, and consequently that the inequality produced in the North Polar Distances will be the best foundation for the desired corrections. If a circle be drawn on paper representing any true parallel of latitude, the centre being the true pole, and any position of the false pole be assumed, the general value of the inequality is at once seen, and the relative position of the longitude at which the inequality vanishes or becomes a maximum. But the exact relations are found as follows:



Let K be the pole of the Ecliptic
P . . . . Sun's true Pole
P′. . . . . . . assumed Pole
N′. . . . assumed Node
(and $\therefore$ $N'P'K=90°$)
$PK=I$, $P'K=I'$, and $PKP'=N-N'$.

Let S be a Solar Spot
$PS=\delta$, $P'S=\delta'$,

then

$$\delta'-\delta=P'Q=PP'.\cos(PP'N+N'P'S)$$

$$=PP'.\cos PP'N'.\cos\alpha'-PP'.\sin PP'N'.\sin\alpha'$$

$$=X.\cos\alpha'-Y.\sin\alpha' \quad . \quad . \quad \text{suppose}$$

where a' is the computed longitude of the Spot from the assumed node, as given in my principal catalogue of positions, and extracted in the series recopied above from it.

If X and Y can be found from a series, or from many combined series of observations, the inequality is readily found from the relations

$$PP' = \sqrt{X^2 + Y^2}, \qquad \tan PP'N' = \frac{Y}{X}$$

and inasmuch as

$$X = PP'. \cos PP'N' = PR = (N - N'). \sin I,$$
$$Y = PP'. \sin PP'N' = P'R = (I - I'),$$

the following give the true elements:

$$I = I' + Y,$$
$$N = N' + X . \operatorname{cosec} I.$$

We have to consider next in what way these quantities X and Y can most advantageously be found from the whole of a number of separate series of Spots, affected each by errors of observation and individual proper motions; and at the outset it may be well to recognize that with such data as floating objects visible on a fluid surface but for a few days at a time, the problem can only be defined to be, 'To find that position of Pole which shall the best reduce these motions to parallelism, and, if any systematic drift towards either Pole shall be found, to symmetry with respect to the concluded Equator.'

I will first give a specimen of the treatment of a single series of observations. Group 50.

Let 176·54 be taken as origin of time, $+10.^\circ\ 20' + d$ (a small unknown quantity) the true latitude at this time, and $\frac{\Delta}{10}$ the change of latitude in one day caused by proper motion, necessarily supposed uniform throughout the observations in the absence of knowledge to the contrary, or of any law of variation. The true latitude at any other time will be $+10^\circ.\ 20' + d - \frac{\Delta}{10} . (t - 176{\cdot}54)$, and by our formula this is

$$= D' + (X. \cos a' - Y. \sin a').$$

We can therefore from the formula

$$X. \cos a' - Y. \sin a' = d + (10^\circ.\ 20' - D') + \frac{\Delta}{10} . (176{\cdot}54 - t)$$

form an equation of condition from each observation.

Thus, from series 50, we have the following

$$-\ {\cdot}792 . X - {\cdot}612 . Y = d - 0' + {\cdot}395 . \Delta$$
$$-\ {\cdot}911 . X - {\cdot}414 . Y = d + 7 + {\cdot}302 . \Delta$$
$$-\ {\cdot}980 . X - {\cdot}182 . Y = d + 7 + {\cdot}201 . \Delta$$
$$-\ {\cdot}996 . X + {\cdot}071 . Y = d - 6 + {\cdot}100 . \Delta$$

$$
\begin{aligned}
- \cdot955 . X + \cdot305 . Y &= d - 4 + \cdot003 . \Delta \\
- \cdot844 . X + \cdot536 . Y &= d - 2 - \cdot098 . \Delta \\
- \cdot685 . X + \cdot730 . Y &= d + 3 - \cdot195 . \Delta \\
- \cdot472 . X + \cdot880 . Y &= d + 12 - \cdot300 . \Delta \\
- \cdot236 . X + \cdot973 . Y &= d + 4 - \cdot402 . \Delta
\end{aligned}
$$

Eliminating d by subtraction of the mean of all these equations from each one,

$$
\begin{aligned}
- \cdot029 . X - \cdot866 . Y &= - 2''\cdot3 + \cdot395 . \Delta \\
- \cdot148 . X - \cdot668 . Y &= + 4\cdot7 + \cdot302 . \Delta \\
- \cdot217 . X - \cdot436 . Y &= + 4\cdot7 + \cdot201 . \Delta \\
- \cdot233 . X - \cdot183 . Y &= - 8\cdot3 + \cdot100 . \Delta \\
- \cdot192 . X + \cdot051 . Y &= - 6\cdot3 + \cdot003 . \Delta \\
- \cdot081 . X + \cdot282 . Y &= - 4\cdot3 - \cdot098 . \Delta \\
+ \cdot078 . X + \cdot476 . Y &= + 0\cdot7 - \cdot195 . \Delta \\
+ \cdot291 . X + \cdot626 . Y &= + 9\cdot7 - \cdot300 . \Delta \\
+ \cdot527 . X + \cdot719 . Y &= + 1\cdot7 - \cdot402 . \Delta
\end{aligned}
$$

Retaining Δ on the right hand side and solving these equations by the method of minimum squares, there result

$$
\begin{aligned}
X &= + 8''\cdot75 - 1\cdot035 . \Delta \\
Y &= + 4\cdot00 - 0\cdot488 . \Delta
\end{aligned}
$$

from which we see that if $\Delta = + 8'$, or if there is a proper motion of only $0''\cdot8$ per diem towards the equator, the signs of the corrections change, and this is a very small and possible quantity.

Take an equidistant South series, No. 59. As before, let Δ indicate motion Southwards. By precisely similar steps, we shall find from this series,

$$
\begin{aligned}
X &= + 2''\cdot31 - 0\cdot511 . \Delta \\
Y &= + 3\cdot86 - 0\cdot780 . \Delta
\end{aligned}
$$

If, in summing up a number of such results, we simply neglect the effect of Δ, by writing zero for it in each equation, we derive a mean result which for the above will be simply

$$X = + 5''\cdot53 \quad , \quad Y = + 3''\cdot93$$

If, on the other hand, we assume that the values of Δ depend on the latitude, and in equal latitudes have equal and opposite signs, we should then divide out the co-efficients of Δ, and write our results thus—

$$
\begin{aligned}
+ 0\cdot970 . X &= + 8\cdot40 - \Delta_1 \\
+ 1\cdot957 . X &= + 4\cdot52 - \Delta_2
\end{aligned}
$$

similarly

$$
\begin{aligned}
+ 2\cdot050 . Y &= + 8\cdot20 - \Delta_1 \\
+ 1\cdot265 . Y &= + 4\cdot89 - \Delta_2
\end{aligned}
$$

whence adding and writing

$$\Delta_1 + \Delta_2 = 0$$

$$X = + 4''\cdot41 \quad , \quad Y = + 3''\cdot95$$

The method of procedure, which I have here applied to two series, might be applied

to numerous pairs North and South, but another obstacle will be found to occur, in addition to the great labour of the process, namely, that when a certain number of satisfactory pairs of series have been chosen from out of the 86 at disposal, the others will not pair together in any satisfactory manner, two and two, with due regard to weight, and we seem to require, at the same time, a readier and more general style of treatment.

Such is the following, which I finally adopted. Each series of observations yields a certain number of observed values of δ' corresponding to observed values of α', from which we can obtain a series of equations

$$\begin{aligned}
\delta'_a - \delta &= \mathrm{X} \,.\, \cos a - \mathrm{Y} \,.\, \sin a \\
\delta'_b - \delta &= \mathrm{X} \,.\, \cos b - \mathrm{Y} \,.\, \sin b \\
\delta'_c - \delta &= \mathrm{X} \,.\, \cos c - \mathrm{Y} \,.\, \sin c \\
\ldots \quad & \quad \ldots
\end{aligned}$$

from which, by subtraction, we can form the following equations, independent of δ, the actual North Polar Distance,

$$\begin{aligned}
\delta'_b - \delta'_a &= \mathrm{X} \,.\, (\cos b - \cos a) - \mathrm{Y} \,.\, (\sin b - \sin a) \\
\delta'_c - \delta'_b &= \mathrm{X} \,.\, (\cos c - \cos b) - \mathrm{Y} \,.\, (\sin c - \sin b) \\
\ldots \quad & \quad \ldots \quad \ldots
\end{aligned}$$

and determine values of X and Y from the successive differences of δ' as observed. In order to determine the values of X and Y, which result from the totality of a large number of series of observations, it is most convenient, however, to interpolate other values of δ' for previously selected values of α' at equal intervals, such as 30 degrees, to tabulate the observed differences of δ' for each series for these angles and to take the mean values of $(\delta'_b - \delta'_a)$, $(\delta'_c - \delta'_b)$, etc. as the data for the determination of the values of X and Y. The table which follows will render the process perfectly clear, and the only point requiring further explanation is the process of interpolation followed, which it will be seen has the advantage of getting rid in a degree of the inevitable errors of observation. Suppose we have a series of observed numbers for *equal* intervals of time, such as the following in the first line below, take their means two and two, as in the second line, and again the means of the first means two and two, as in the third line,

454 , 478 , 490 , 536 , 588 , 614, etc.
466 , 484 , 513 , 562 , 601, etc.
475 , 498 , 537 , 582, etc.

it will be apparent, particularly on laying down these values graphically, that by the substitution of the numbers in the third line for those in the first line, the irregularities of the values (supposed to be observed values) are in a great measure mutually destroyed, while the law of progress is left intact. I have applied this process to the observed values of δ' for each series of observations of the spots selected as data for elements, by laying them down graphically, interpolating between them two and two with the observed unequal differences of α', and in the second taking of means found values of δ' correspond-

ing to equal differences of α', namely, at each 30 degrees. The trial of any one case will show at once that there is no difficulty in so doing. In this manner I have substituted for the original series of observations the following interpolated series, in which the arrangement follows the order of North Polar Distance and North Polar Distances are substituted for latitudes as required by the formula.

Spot.	α'	δ'	Diff.	Spot.	α'	δ'	Diff.
	°	° ′	′		°	° ′	′
797	210	58. 26		598	300	68. 15	
	240	29	+ 3		330	4	−11
	270	37	+ 8		360	67. 57	− 7
	300	44	+ 7		30	57	0
	330	58. 47	+ 3		60	56	− 1
					90	67. 55	− 1
453	150	59. 34					
	180	43	+ 9	840	240	68. 24	
	210	59. 51	+ 8		270	43	+19
					300	39	− 4
209	330	60. 21			330	25	−14
	360	60. 10	−11		360	12	−13
					30	67. 55	−17
478	150	60. 7					
	180	38	+31	189	240	68. 43	
	210	61. 4	+26		270	52	+ 9
	240	20	+16		300	59	+ 7
					330	51	− 8
171	180	62. 35			360	68. 35	−16
	210	20	−15				
	240	61. 46	−34	38	120	70. 46	
	270	34	−12		150	37	− 9
					180	70. 24	−13
194	240	64. 24					
	270	10	−14	789	180	70. 45	
	300	2	− 8		210	35	−10
	330	63. 50	−12		240	38	+ 3
	360	33	−17		270	49	+11
	30	10	−23		300	70. 59	+10
884	300	64. 45		187	210	71. 1	
	330	36	− 9		240	1	0
	360	28	− 8		270	3	+ 2
	30	64. 20	− 8		300	5	+ 2
					330	0	− 5
592	0	64. 58			360	70. 46	−14
	30	65. 20	+22				
	60	65. 38	+18	658	30	71. 25	
					60	7	−18
799	180	65. 40			90	5	− 2
	210	34	− 6		120	20	+15
	240	30	− 4		150	71. 30	+10
	270	24	− 6				
	300	18	− 6	632	30	71. 52	
	330	65. 21	+ 3		60	35	−17

Spot.	a'	δ'	Diff.
32	90°	71° 54'	
	120	40	−14'
770	180	72. 47	
	210	59	+12
	240	73. 4	+ 5
	270	10	+ 6
709	90	74. 17	
	120	47	+30
	150	75. 4	+17
720	120	74. 45	
	150	55	+10
	180	74. 40	−15
815	210	74. 59	
	240	75. 5	+ 6
	270	9	+ 4
	300	11	+ 2
	330	75. 9	− 2
839	210	74. 54	
	240	75. 3	+ 9
	270	10	+ 7
	300	75. 19	+ 9
808	180	75. 14	
	210	4	−10
	240	0	− 4
	270	75. 3	+ 3
814	180	75. 37	
	210	40	+ 3
	240	32	− 8
	270	10	−22
	300	4	− 6
	330	75. 1	− 3
	360	74. 55	− 6
792	180	75. 53	
	210	58	+ 5
	240	57	− 1
	270	50	− 7
	300	35	−15
	330	75. 22	−13
582	300	75. 56	
	330	50	− 6
	360	43	− 7
	30	75. 37	− 6
408	90	76. 36	
	120°	76° 56'	+20'
	150	77. 12	+16
747	180	78. 20	
	210	30	+10
775	150	79. 11	
	180	10	− 1
	210	1	− 9
	240	78. 55	− 6
	270	45	−10
	300	78. 36	− 9
889	300	79. 15	
	330	12	− 3
	360	10	− 2
	30	7	− 3
	60	6	− 1
	90	79. 10	+ 4
612	330	79. 41	
	360	30	−11
	30	22	− 8
	60	14	− 8
	90	79. 5	− 9
486	150	79. 51	
	180	53	+ 2
	210	43	−10
	240	32	−11
	270	79. 14	−18
50	150	79. 26	
	180	35	+ 9
	210	38	+ 3
	240	79. 48	+10
66	240	79. 35	
	270	46	+11
	300	79. 37	− 9
69	270	82. 14	
	300	3	−11
	330	81. 39	−24
	360	16	−23
	30	80. 58	−18
725	120	81. 58	
	150	82. 6	+ 8
	180	82. 15	+ 9
787	210	82. 20	
	240	12	− 8

Spot.	α'	δ'	Diff.
	270°	82° 11'	− 1'
	300	82. 10	− 1
107	270	82. 5	
	300	35	(+30)
	330	53	+18
	360	82. 60	+ 7
890	300	82. 31	
	330	40	+ 9
	360	50	+10
	30	56	+ 6
	60	82. 43	−13
950	60	83. 10	
	90	20	+10
	120	83. 22	+ 2
58	180	83. 29	
	210	40	+11
	240	54	+14
	270	84. 5	+11
	300	11	+ 6
	330	84. 11	0
903	30	84. 20	
	60	18	− 2
	90	84. 37	+19
677	30	96. 22	
	60	33	+11
653	30	96. 51	
	60	55	+ 4
	90	52	− 3
	120	31	−21
	150	96. 24	− 7
830	240	98. 18	
	270	15	− 3
	300	11	− 4
	330	9	− 2
	360	98. 8	− 1
867	270	98. 4	
	300	0	− 4
	330	2	+ 2
	360	26	+24
	30	98. 50	+24
86	30	99. 5	
	60	10	+ 5
	90	17	+ 7

Spot.	α'	δ'	Diff.
	120°	99° 16'	− 1'
	150	99. 7	− 9
851	270	99. 24	
	300	12	−12
	330	6	− 6
	360	99. 5	− 1
281	120	99. 50	
	150	31	−19
	180	99. 5	−26
	210	98. 54	−11
	240	52	− 2
	270	98. 52	0
872	300	99. 40	
	330	40	0
	360	41	+ 1
	30	44	+ 3
	60	99. 49	+ 5
297	150	99. 48	
	180	49	+ 1
	210	50	+ 1
	240	54	+ 4
	270	99. 53	− 1
59	210	100. 11	
	240	19	+ 8
	270	100. 20	+ 1
811	240	100. 50	
	270	45	− 5
	300	100. 30	−15
57	180	101. 30	
	210	10	−20
	240	3	− 7
	270	100. 54	− 9
	300	100. 35	−19
834	270	101. 45	
	300	40	− 5
	330	102. 0	+20
	360	20	+20
113	90	101. 40	
	120	102. 0	+20
	150	18	+18
	180	25	+ 7
	210	102. 16	− 9
949	30	102. 13	

Spot.	α'	δ'	Diff.
	60°	102°. 27′	+14′
	90	33	+ 6
	120	102. 9	−24
	150	101. 38	−31
459	150	102. 40	
	180	38	− 2
	210	102. 36	− 2
730	150	102. 32	
	180	32	+ 0
	210	41	+ 9
	240	102. 48	+ 7
753	120	102. 60	
	150	44	−16
	180	30	−14
	210	26	− 4
	240	29	+ 3
	270	102. 20	− 9
440	120	104. 5	
	150	103. 58	− 7
	180	103. 50	− 8
291	150	103. 55	
	180	104. 10	+15
	210	104. 7	− 3
	240	103. 56	−11
	270	103. 55	− 1
51	150	104. 47	
	180	46	− 1
	210	40	− 6
	240	15	−25
	270	103. 45	−30
777*a*	180	105. 42	
	210	31	−11
	240	11	−20
	270	104. 50	−21
	300	25	−25
749	150	105. 11	
	180	22	+11
597	330	106. 10	
	360	105. 54	−16
	30	37	−17
208	330	106. 59	
	360	46	−13
	30	106. 37	− 9
207	300°	106°. 41′	
	330	57	+16′
	360	57	0
	30	106. 55	− 2
777*b*	180	107. 7	
	210	20	+13
	240	25	+ 5
	270	107. 18	− 7
807	180	108. 38	
	210	40	+ 2
	240	25	−15
	270	24	− 1
	300	16	− 8
	330	108. 23	+ 7
267	90	109. 57	
	120	41	−16
	150	28	−13
	180	109. 26	− 2
296	180	109. 34	
	210	35	+ 1
	240	47	+12
	270	110. 5	+18
873*b*	330	110. 20	
	360	18	− 2
	30	110. 15	− 3
170	180	110. 14	
	210	27	+13
	240	36	+ 9
	270	110. 35	− 1
871	270	110. 60	
	300	51	− 9
	330	36	−15
	360	20	−16
	30	110. 14	− 6
157	90	111. 38	
	120	26	−12
	150	35	+ 9
	180	51	+16
	210	49	− 2
	240	111. 27	−22
161	120	111. 20	
	150	50	+30
	180	112. 4	+14
	210	20	+16

Spot.	a'	δ'	Diff.	Spot.	a'	δ'	Diff.
	°	° ′			°	° ′	
760	150	112. 12	′	180	240	116. 40	′
	180	14	+ 2		270	40	0
	210	27	+13		300	34	− 6
	240	112. 30	+ 3		330	116. 43	+ 9
650	0	114. 6		140	0	117. 57	
	30	113. 58	− 8		30	52	− 5
	60	114. 8	+10		60	117. 49	− 3
	90	28	+20				
	120	41	+13	575	270	118. 26	
	150	114. 30	−11		300	20	− 6
					330	9	−11
619	0	114. 32			360	1	− 8
	30	48	+16		30	117. 55	− 6
	60	115. 2	+14		60	117. 57	+ 2
	90	18	+16				
				173	180	118. 55	
873*a*	270	116. 14			210	37	−18
	300	115. 48	−26		240	62	+25
	330	23	−25		270	54	− 8
	360	0	−23		300	118. 20	−34
	30	114. 44	−16		330	117. 50	−30

The differences of δ' thus found from each series of observations can now be readily combined by tabulating them as follows, and forming mean values.

TABLE.

	δ'	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
	° ′													
1	58. 35								+ 3	+ 8	+ 7	+ 3		797*
2	59. 42						+ 9	+ 8						453
3	60. 16												−11	209
4	60. 44						+31	+26	+16					478*
5	62. 5							−15	−34	−12				171*
6	63. 47	−23								−14	− 8	−12	−17	194*
7	64. 33	− 8										− 9	− 8	884
8	65. 18	+22	+18											592
9	65. 29							− 6	− 4	− 6	− 6	+ 3		799*
10	68. 5	0	− 1	− 1								−11	− 7	598*
11	68. 19	−17							+24	+19	− 4	−14	−13	840*
12	68. 47									+ 9	+ 7	− 8	−16	189*
13	70. 35					− 9	−13							38
14	70. 47							−10	+ 3	+11	+10			789*
15	70. 55								0	+ 2	+ 2	− 5	−14	187*
16	71. 18		−18	− 2	+15	+10								658*
17	71. 46		−17											632
18	71. 47				−14									32
Sums . .		−26	−18	− 3	+ 1	+ 1	+27	+ 3	+ 8	+17	+ 8	−53	−86	

	δ'	0°–30°	30°–60°	60°–90°	90°–120°	120°–150°	150°–180°	180°–210°	210°–240°	240°–270°	270°–300°	300°–330°	330°–360°	
Continued		−26	−18	− 3	+ 1	+ 1	+27	+ 3	+ 8	+17	+ 8	−53	−86	
19	72. 59							+12	+ 5	+ 6				770*
20	74. 40				+30	+17								709*
21	74. 45					+10	−15							720
22	75. 5								+ 6	+ 4	+ 2	− 2		815*
23	75. 7								+ 9	+ 7	+ 9			839*
24	75. 7							−10	− 4	+ 3				808*
25	75. 18							+ 3	− 8	−22	− 6	− 3	− 6	814
26	75. 40							+ 5	− 1	− 7	−15	−13		792
27	75. 47	− 6										− 6	− 7	582
28	76. 54				+20	+16								408
29	78. 25							+10						747
30	78. 53						− 1	− 9	− 6	−10	− 9			775
31	79. 10	− 3	− 1	+ 4								− 3	− 2	889
32	79. 23	− 8	− 8	− 9									−11	612
33	79. 34						+ 2	−10	−11	−18				486
34	79. 37						+ 9	+ 3	+10					50
35	79. 40									+11	− 9			66
36	81. 36	−18									−11	−24	−23	69
37	82. 8					+ 8	+ 9							725*
38	82. 15								− 8	− 1	− 1			787*
39	82. 32											+18	+ 7	107
40	82. 44	+ 6	−13									+ 9	+10	890*
41	83. 16			+10	+ 2									950
42	83. 50							+11	+14	+11	+ 6	0		58*
43	84. 28		− 2	+19										903
44	96. 28		+11											677
45	96. 40		+ 4	− 3	−21	− 7								653
46	98. 13									− 3	− 4	− 2	− 1	830
47	98. 25	+24									− 4	+ 2	+24	867*
48	99. 11		+ 5	+ 7	− 1	− 9								86*
49	99. 15										−12	− 6	− 1	851*
50	99. 21					−19	−26	−11	− 2	0				281*
51	99. 45	+ 3	+ 5									0	+ 1	872*
52	99. 51						+ 1	+ 1	+ 4	− 1				297*
53	100. 15								+ 8	+ 1				59*
54	100. 40									− 5	−15			811
55	101. 3							−20	− 7	− 9	−19			57*
56	102. 0										− 5	+20	+20	834*
57	102. 3				+20	+18	+ 7	− 9						113*
58	102. 7		+14	+ 6	−24	−31								949
59	102. 38						− 2	− 2						459
60	102. 40						0	+ 9	+ 7					730
61	102. 40					−16	−14	− 4	+ 3	− 9				753*
62	103. 58					− 7	− 8							440
63	104. 3						+15	− 3	−11	− 1				291*
64	104. 16						− 1	− 6	−25	−30				51*
65	105. 4							−11	−20	−21	−25			777a*
66	105. 17						+11							749*
67	105. 54	−17											−16	597*
68	106. 48	− 9											−13	208
Sums . .		−54	− 3	+31	+27	−19	+14	−38	−29	−77	−110	−63	−104	

δ'		0°–30°	30°–60°	60°–90°	90°–120°	120°–150°	150°–180°	180°–210°	210°–240°	240°–270°	270°–300°	300°–330°	330°–360°	
Continued		−54	− 3	+31	+27	−19	+14	−38	−29	−77	−110	−63	−104	
69	106. 49	− 2										+16	0	207*
70	107. 16							+13	+ 5	− 7				777*b**
71	108. 28							+ 2	−15	− 1	− 8	+ 7		807*
72	109. 42				−16	−13	− 2							267
73	109. 50							+ 1	+12	+18				296*
74	110. 18	− 3											− 2	873*b*
75	110. 32							+13	+ 9	− 1				170*
76	110. 37	− 6									− 9	−15	−16	871*
77	111. 39				−12	+ 9	+16	− 2	−22					157*
78	111. 50					+30	+14	+16						161*
79	112. 21						+ 2	+13	+ 3					760
80	114. 20	− 8	+10	+20	+13	−11								650*
81	114. 55	+16	+14	+16										619*
82	115. 29	−16									−26	−25	−23	873*a**
83	116. 39									0	− 6	+ 9		180*
84	117. 51	− 5	− 3											140
85	118. 14	− 6	+ 2								− 6	−11	− 8	575*
86	118. 26							−18	+25	− 8	−34	−30		173*
Total Sums.		−84	+20	+67	+12	− 4	+44	0	−12	−76	−199	−112	−153	
Nos. . . .		22	17	11	12	19	22	32	34	35	29	29	26	
Means . .		−3·8	+1·2	+6·1	+1·0	−0·2	+2·0	0·0	−0·4	−2·2	−6·9	−3·9	−5·9	
Weights .		4·7	4·1	3·3	3·5	4·4	4·7	5·7	5·8	5·9	5·4	5·4	5·1	

On multiplying each of these mean values by its weight, summing the whole, and dividing by the sum of the weights, we find a mean excess of $-1'\!\cdot\!5$, which would imply that on the whole there is an average tendency towards the North Pole of 90 seconds in the time during which the Sun rotates through 30 degrees. I can only regard this as a fictitious and non-real result arising from the omission of some small correction whereby the angles of position come out too great in the first half of any Spot's passage over the disk, and too small in the second half. The omission of θ, the correction for non-verticality of the bars, will not account for the result. If the correction to the angle of position had been

$$-\ \theta\ (\tfrac{1}{2} + \sin^2 \alpha')\ \text{instead of}\ +\ \theta\ (\tfrac{1}{2} - \sin^2 \alpha')$$

the discrepancy would have been immediately explained, but the correction given in the text is plainly correct on general considerations as well as in its detailed proof. It is possible that the omission of the correction for refraction may be the cause, in conjunction with the circumstance that for the most part the observations were made after noon. However this may be, for I cannot now introduce this correction, inasmuch as in our present inquiry we are only concerned with that part of the mean differences which follows the law of the sine, and presents an equal departure on the whole on either side of zero,

we must deduct this quantity $-1'\cdot 5$ from our previously determined results before seeking the values of X and Y.

Our data thus become

	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
Diff.	$-2'\cdot 3$	$+2'\cdot 7$	$+7'\cdot 6$	$+2'\cdot 5$	$+1'\cdot 3$	$+3'\cdot 5$	$+1'\cdot 5$	$+1'\cdot 1$	$-0'\cdot 7$	$-5'\cdot 4$	$-2'\cdot 4$	$-4'\cdot 4$	
Wts.	4·7	4·1	3·3	3·5	4·4	4·7	5·7	5·8	5·9	5·4	5·4	5·1	

and give the following equations of condition

$$
\begin{array}{l}
(- \cdot 134 \,.\, X - \cdot 500 \,.\, Y = - 2\cdot 3) \times 4\cdot 7 \\
(- \cdot 366 \,.\, X - \cdot 366 \,.\, Y = + 2\cdot 7) \times 4\cdot 1 \\
(- \cdot 500 \,.\, X - \cdot 134 \,.\, Y = + 7\cdot 6) \times 3\cdot 3 \\
(- \cdot 500 \,.\, X + \cdot 134 \,.\, Y = + 2\cdot 5) \times 3\cdot 5 \\
(- \cdot 366 \,.\, X + \cdot 366 \,.\, Y = + 1\cdot 3) \times 4\cdot 4 \\
(- \cdot 134 \,.\, X + \cdot 500 \,.\, Y = + 3\cdot 5) \times 4\cdot 7 \\
(+ \cdot 134 \,.\, X + \cdot 500 \,.\, Y = + 1\cdot 5) \times 5\cdot 7 \\
(+ \cdot 366 \,.\, X + \cdot 366 \,.\, Y = + 1\cdot 1) \times 5\cdot 8 \\
(+ \cdot 500 \,.\, X + \cdot 134 \,.\, Y = - 0\cdot 7) \times 5\cdot 9 \\
(+ \cdot 500 \,.\, X - \cdot 134 \,.\, Y = - 5\cdot 4) \times 5\cdot 4 \\
(+ \cdot 366 \,.\, X - \cdot 366 \,.\, Y = - 2\cdot 4) \times 5\cdot 4 \\
(+ \cdot 134 \,.\, X - \cdot 500 \,.\, Y = - 4\cdot 4) \times 5\cdot 1
\end{array}
$$

which, when solved by the method of least squares, give the values

$$X = -5'\cdot 24 \qquad Y = +4'\cdot 52$$

and therefore

$$\delta' - \delta = 6'\cdot 9 \,.\, \cos\,(\,\alpha' + 139^\circ.\,10'\,)$$

for the inequality in the value of δ', as deduced from observation by the assumed elements

$$I = 7^\circ.\,10' \qquad \text{and } N = 74^\circ.\,30' \text{ for } 1854\cdot 0$$

and therefore as the true elements

$$I = 7^\circ.\,14'\cdot 5 \qquad \text{and } N = 73^\circ.\,49' \text{ for } 1854\cdot 0$$

As a check on this result, I have next made a further selection of 60 of the best series, namely, those marked in the above table with an asterisk after the group-number, and have submitted them to similar treatment. On summing the differences multiplied by their weights it is found, as in the case of the whole, that there is again a mean excess of motion towards the North of $0'\cdot 9$ for 30 degrees of rotation. I deduct this amount as before, on the same grounds, and then find the following data,

	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
Diff.	$-3'\cdot 9$	$+0'\cdot 4$	$+5'\cdot 9$	$+13'\cdot 0$	$+5'\cdot 7$	$+6'\cdot 4$	$-0'\cdot 2$	$+0'\cdot 5$	$-0'\cdot 7$	$-5'\cdot 8$	$-3'\cdot 7$	$-5'\cdot 5$	
Wts.	4·1	3·2	2·6	2·6	3·3	3·6	5·1	5·6	5·7	5·2	5·1	4·5	

from which, by similar treatment as in the former case, I find

$$X = -\ 7'{\cdot}87 \quad \text{and} \quad Y = +\ 7'{\cdot}33$$

the corresponding inequality

$$\delta' - \delta = 10'{\cdot}7 \ .\ \cos\ (\ \alpha' + 137^\circ.\ 2'\ )$$

and for true elements

$$I = 7^\circ.\ 17'{\cdot}3 \ \ ,\ \ N = 73^\circ.\ 28' \ \text{ for } \ 1854{\cdot}0\ .$$

It is desirable to point out, what inspection will otherwise show, that the distribution of the series of spots selected as data, is in each case very uniform. In the case of all 86 groups, 21 series have greater N. latitude than 15 degrees, 22 series lie between 15° North and the equator, 22 other series between the equator and 15° South, and 21 series have greater South latitude than 15 degrees. In the case of the 60 series of superior character, 30 are N. series and 30 South.

I flatter myself that this method of treatment will be considered at the same time convenient and accurate in principle, and that the result arrived at will be held to have superior weight as an astronomical determination to those of the same elements by my predecessors in this line of inquiry. The elements of M. Laugier were based, as stated in the Comptes Rendus for 1842, Deuxieme Cahier, page 940, on 29 series of observations made and discussed by himself, and are as follows,

$$I = 7^\circ.\ 9' \ \ ,\ \ N = 75^\circ.\ 8' \ \text{ for } \ 1840{\cdot}0\ .$$

It is to be regretted that his Memoir, though recommended for publication in the Journal des Savans Etrangers, has never been printed, and that its future publication remains still uncertain, perhaps I should say now improbable, for I believe his determinations to be the best previous to my own, and they will be found to lie between my values and the only others which can be placed in competition with the two, I mean those of Dr. Böhm. The Elements of Dr. Böhm are given in his elaborate Memoir, Aus dem III. Bande der Denkschriften der Math. Classe, &c. &c. der Kaiserlichen Akademie zu Wien, 1852, and are $I = 6.\ 56{\cdot}7$, $N = 76.\ 46{\cdot}9$ for 1833·0 and depend on 13 series of observations, which the reader can refer to if he thinks desirable. I will only remark that his process of treatment being somewhat involved, it is not easy to examine the details, and that the use of Dr. Böhm's values in my reductions would have led to the very noticeable inequality

$$\delta' - \delta = 31'{\cdot}5 \ .\ \cos\ (\ \alpha' + 144^\circ.\ 15'\ )$$

indicating with certainty the necessity of large corrections of his Elements in the direction of M. Laugier's and mine.

Considering that fractions of minutes cannot as yet be determined, I propose for future adoption the Elements

$$I = 7^\circ.\ 15' ,\ \ N = 73^\circ.\ 40' \ \text{ for } \ 1850{\cdot}0$$

till clearly superseded by the superior means and length of observation of some succeeding Astronomer, who can devote more than eight years of continuous research to the subject, and take advantage of finer skies, and I hope Photography. I believe I shall be not far wrong in saying that a sensible improvement on the above values will not be obtainable by an expenditure of less than five thousand pounds.

SECTION V.

On the tendency of Spots to diverge.

The fact will be best studied by reference to the diagrams. It appears to me to be only explicable by the tendency of spots to break out two and two or to subdivide, coupled with a gyratory motion of their parts, which for every spot in the same hemisphere will take place in the direction of rotation around the pole of that hemisphere, or what is called right-handed in the South and left-handed in the North Hemisphere. The outer portions of two contiguous spots will therefore have opposed motions producing mutual centrifugal pressure.

Compare first the following series where the tendency is exhibited in mere dots:

Spots 10, 114, 165 and 228.

Next, the following five instances of subdivision and divergence:

Spots 182, 224, 290, 697, and 813.

The following are ordinary cases, some very remarkable, as for instance 183:

Groups 22, 55, 99, 124, 152, 183, 249, 250, 261, 293, 305, 487, 617, 629, 645, 687, 706, 707, 752, 811, 894, 905, 933, and 939.

There are cases in which the absence of this tendency is equally to be remarked:

See 79, 139, 292, 412, 419, 664, 854, 858, 938, 941, and 951.

The impression which these examples are calculated to produce would be more forcibly conveyed if the figures to which the numbers relate could again be given collectively, but the necessarily large amount of illustrations which the subject involves, forbids indulging in any repetition which can be avoided, and I must put the reader to the trouble of referring to the figures in their serial order.

SECTION VI.

On Recurrence in the same Neighbourhood.

I have thought that an index to such cases of probable recurrence as I have noticed would be desirable, as the possibility of the cause of formation of a spot remaining after its disappearance, and giving rise to a second and third is a point of some consequence to the theory of their origin. The variability of form renders it almost impossible to come to any decision on which argument might be based.

Compare Groups 58 and 63.—58 is a single spot tending to extinction, which is succeeded next rotation by 63, a complex group in the same neighbourhood a little North.

144 and 146.—Different in the same position.

161 and 172.—One component of 172 occupies nearly the position of 161 when last seen.

167 and 171.—The first must have disappeared.

174 and 184.—Very similar and certainly different.

179.—The "following" portion visibly receives a considerable re-development in the latter half of its passage over the disk.

182 is followed by 192 in the same position.

183, 194, 204 and 211.—194 is probably identical with part of 183, but 204 is a renewal after entire obliteration, and 211 is a second renewal in the same part.

193 and 203.—Very similar outbreaks. 193 must have disappeared several days before the first appearance of 203.

220 and 229.—Examine the accession to 229 and compare with 220 B.

667, 690 and 711.—Seem to be three successive outbreaks in nearly the same part.

703 and 723.—Dots in nearly the same place.

704, 724 and 746.—Three successive outbreaks.

817 and 842.—Distinct outbreaks.

854 and 940 each receive considerable accessions in their passage over the disk.

CONCLUDING SECTION.

FROM a desire to dismiss this self-imposed task for the present, which of late has been continued with much personal inconvenience, I forbear here to enter on the evidence which the motions of normal spots afford of the existence and extent of a refracting atmosphere round the Sun. The method has been sketched out elsewhere and an example of its application given. Much additional matter is contained in this memoir for following on the inquiry at a future time.

I equally forbear from theoretical speculation on the origin of the term in the Rotation of the Photosphere depending on the latitude. The general fact which it more accurately expresses of Rotation at the Equator faster than the mean angular motion, however, appears to me strongly to support the views expressed by Professor W. Thomson in his memoir on the "Mechanical Energies of the Solar System," (Trans. Roy. Soc. Edin. Vol. xxi.) in which a continued acceleration of the Sun's rotatory motion is shown to be one probable consequence of the vortical motion of the meteoric matter which is there shown to be the most probable source of the Solar heat and light. In the absence of an impressed motion from some such external source it would be expected that the currents of the surface of the Sun would resemble those of the Earth's ocean and atmosphere, and be Westerly and towards the Poles in the tropical latitudes, and Easterly in the higher latitudes; the direction of Rotation in each case being the same, and the Equatorial region in each the hottest.

At the end of the series of illustrations I give a Plate on which are laid down to scale, 1stly, the variations of Spot-frequency, 2ndly, the variations of the distance from the Sun of the Planet Jupiter, and 3rdly, the variations in the Imperial average price of wheat as published by Mr. Stanton of the Estates Gazette Office in Fleet Street. The first of these curves is deduced by interpolation from the annual mean numbers deduced by Prof. Wolf of Zürich, from various ancient series of observations which he has sought out and collected, and which are given in No. 12 of his "Mittheilungen über die Sonnenflecken," p. 72. The extension backwards which Prof. Wolf has thus given to what was previously known on this periodic variation is extremely valuable, and presents a problem for solution of very high importance, and which has been for some years before me as a subject of thought. I purposely contrast with it the variations of Jupiter's Radius Vector, as offering the only approximate agreement which I have been able to perceive. It will be seen that from the year 1770 there is a very fair general agreement between maxima of frequency and maxima of Jupiter's Radius Vector, and

between minima and minima, with such an amount of loose discrepancy as to throw grave doubt on any hasty conclusion of physical connexion. In the two periods which precede that date there appears to be a total disagreement, and although the data for frequency are less certain for those years, yet the general form of the curve of Prof. Wolf is probably too well established to admit of anything like reversion by the addition of other observations which have not yet come to hand. In this case, though unfavourable to our purpose, it is important to see before us an instance in which eight consecutive cases of general but imperfect agreement between the variations of two physical phenomena are shown to be insufficient to base any conclusion upon, at the same time that they powerfully stimulate further inquiry with the view of ascertaining whether the discrepancy may admit of future explanation. I attach no importance to the wheat diagram, but data of this kind were employed in an interesting and original investigation of the elder Herschel which has been frequently referred to in subsequent years. The present diagram appears to me rather to indicate that, concurrently with abundant and deficient crops, social and political causes affect prices to an extent sufficient to destroy their value for the purpose for which he selected them.* Returning to the Jupiter curve and bearing in mind the part which the material of the Zodiacal light plays in the opinion of Prof. Thomson, I suggest that it deserves consideration whether the mass of Jupiter may not affect the variations of Solar Spot-frequency indirectly through his possible intermediate action on the ring of matter constituting the appearance termed the Zodiacal light. If this view should be thought of any weight it will be seen to be desirable that in establishing a special station for the further observation of Solar phenomena, a situation should be selected, where at the same time observations may be made under the most advantageous circumstances on this ring of matter, of which so little that is exact is yet known, and this leads at once to the conclusion that such a tropical station as Captain Jacob had intended to occupy in India is the most suitable for the purpose. There at an elevation of 5000 feet above sea, almost continuous observations might be made on both phenomena simultaneously, and in no other than a similar position.

It hardly needs the addition of my opinion that in future observations of the Sun and his Spots, the methods of photographic registration and of Nature printing of the results, brought to a high state of completeness and efficiency by Mr. De la Rue are obviously those to be followed, rather than the method of sketching and time observations which I have employed, while those improved processes were not yet worked out. I refer particularly to an admirable specimen recently published by Mr. De la Rue in the Monthly Notices of the Royal Astronomical Society.

* It will probably be noticed, that no previously uninformed person could from the curve infer the year of the abolition of the Corn Laws.

PLATES.

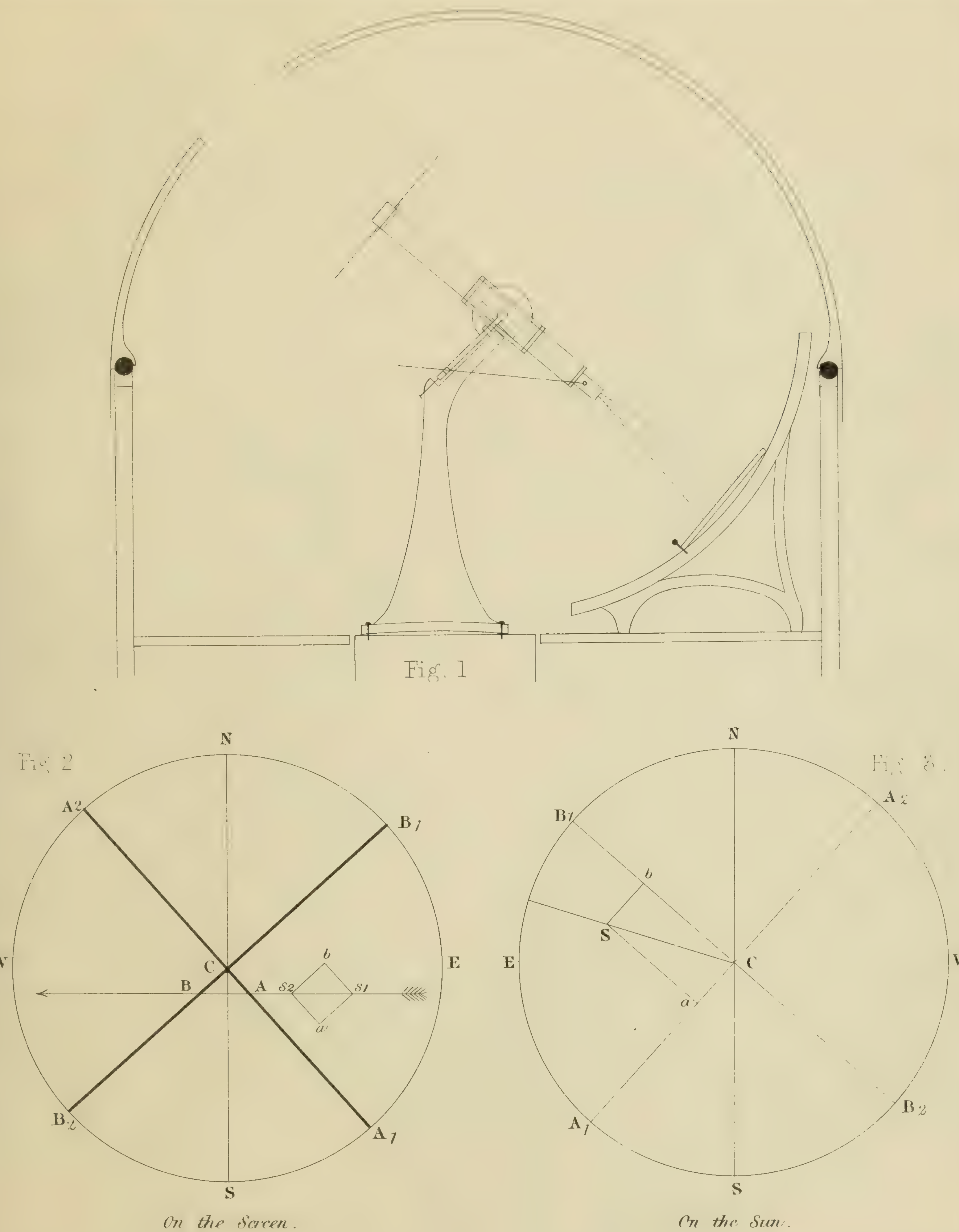


Fig. 1
Fig. 2
N
W
E
S
C
A
B
A2
B1
B2
A1
b
a
s2
s1
On the Screen.
Fig. 3.
N
E
W
S
C
S
b
a
A2
B1
B2
A1
On the Sun.

Fig 4

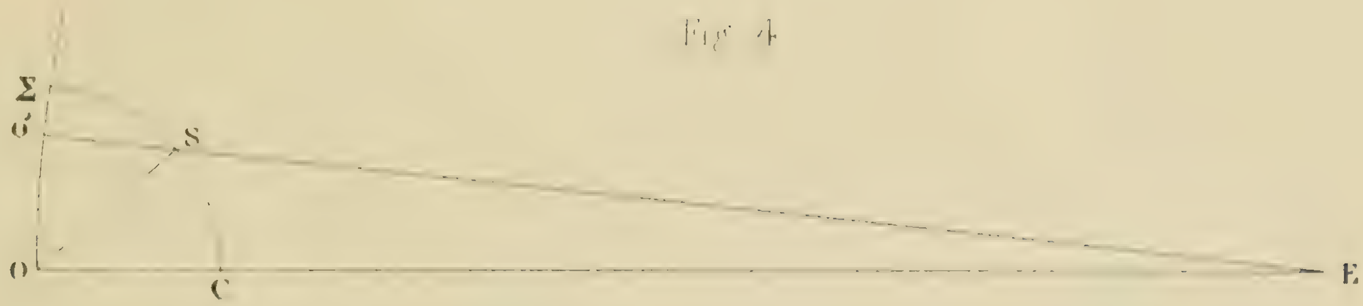


Fig 6

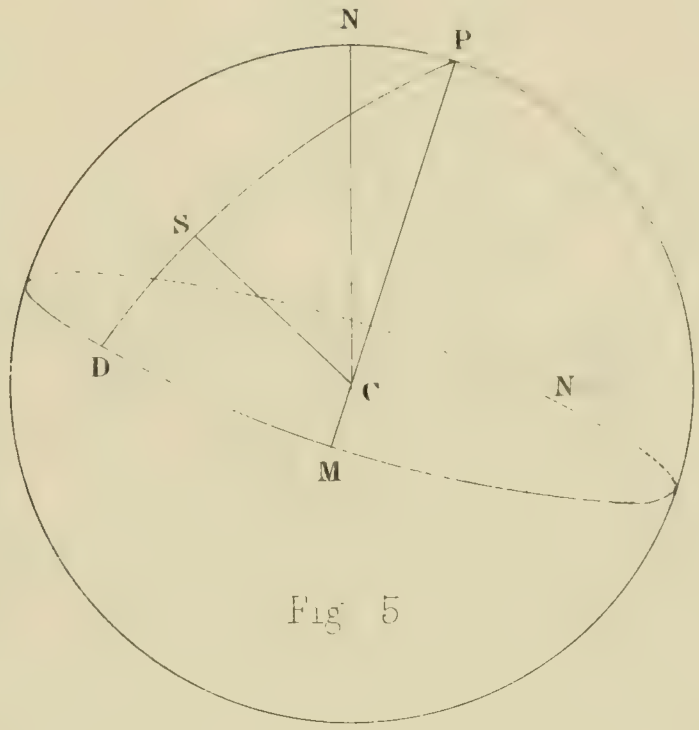


Fig 5

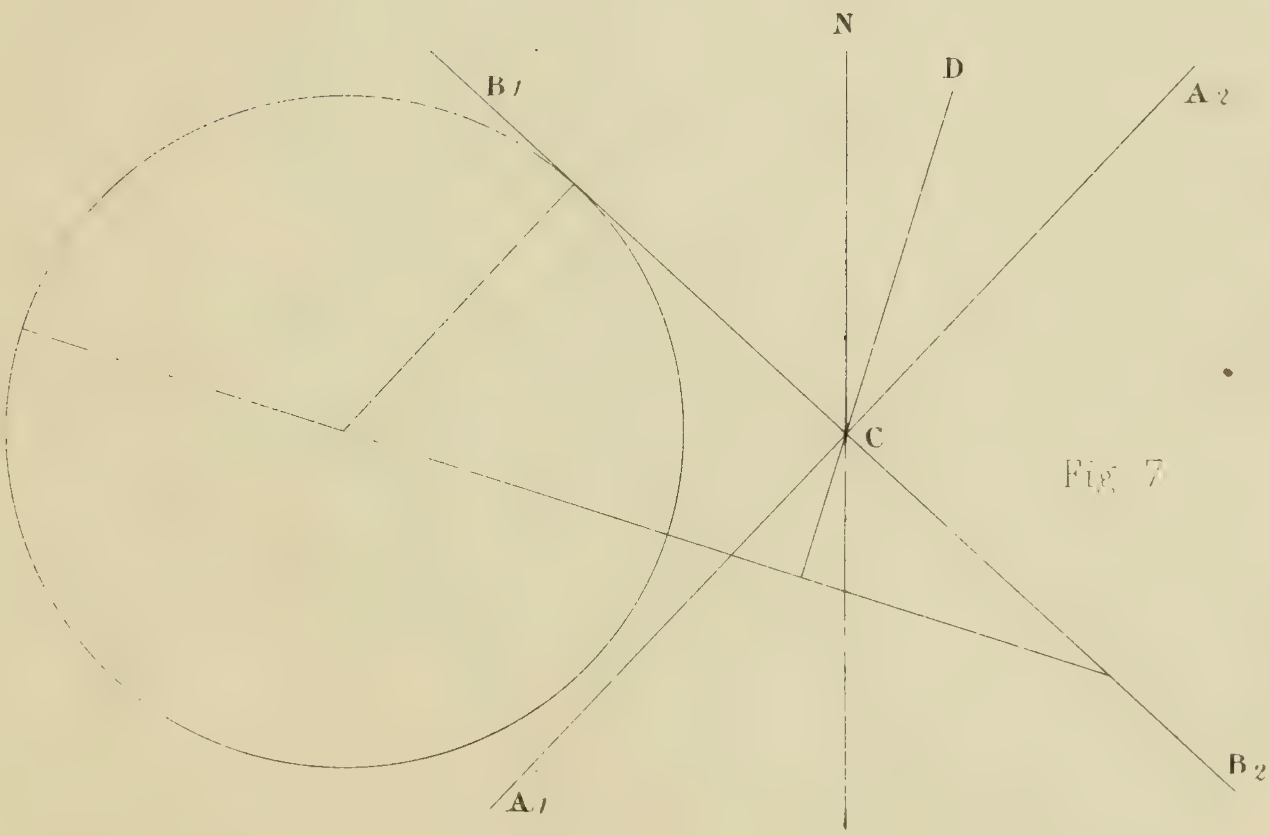
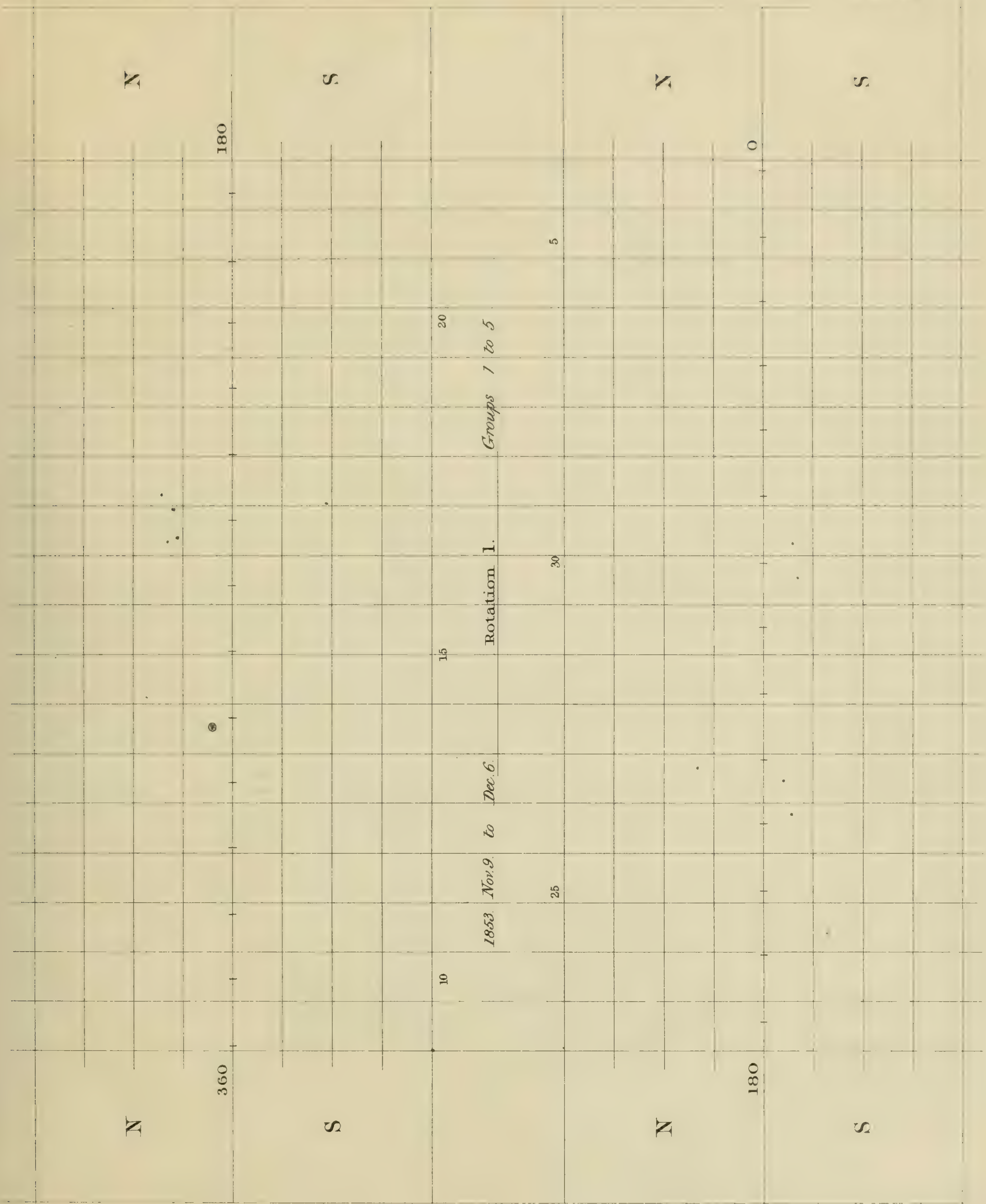


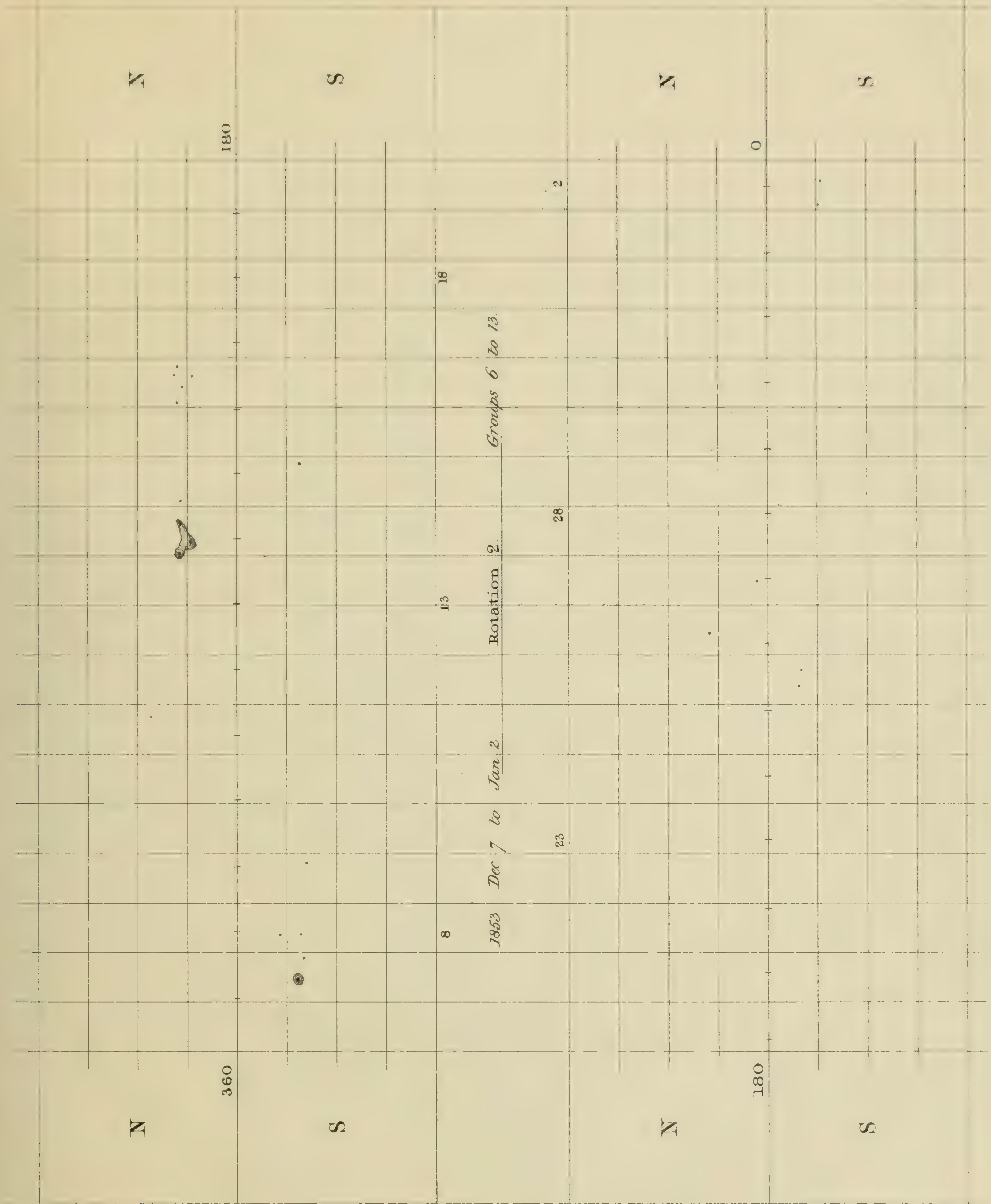
Fig 7



R. C. C. Del.

Fredk Dangerfield Lith

PLATE. 4.



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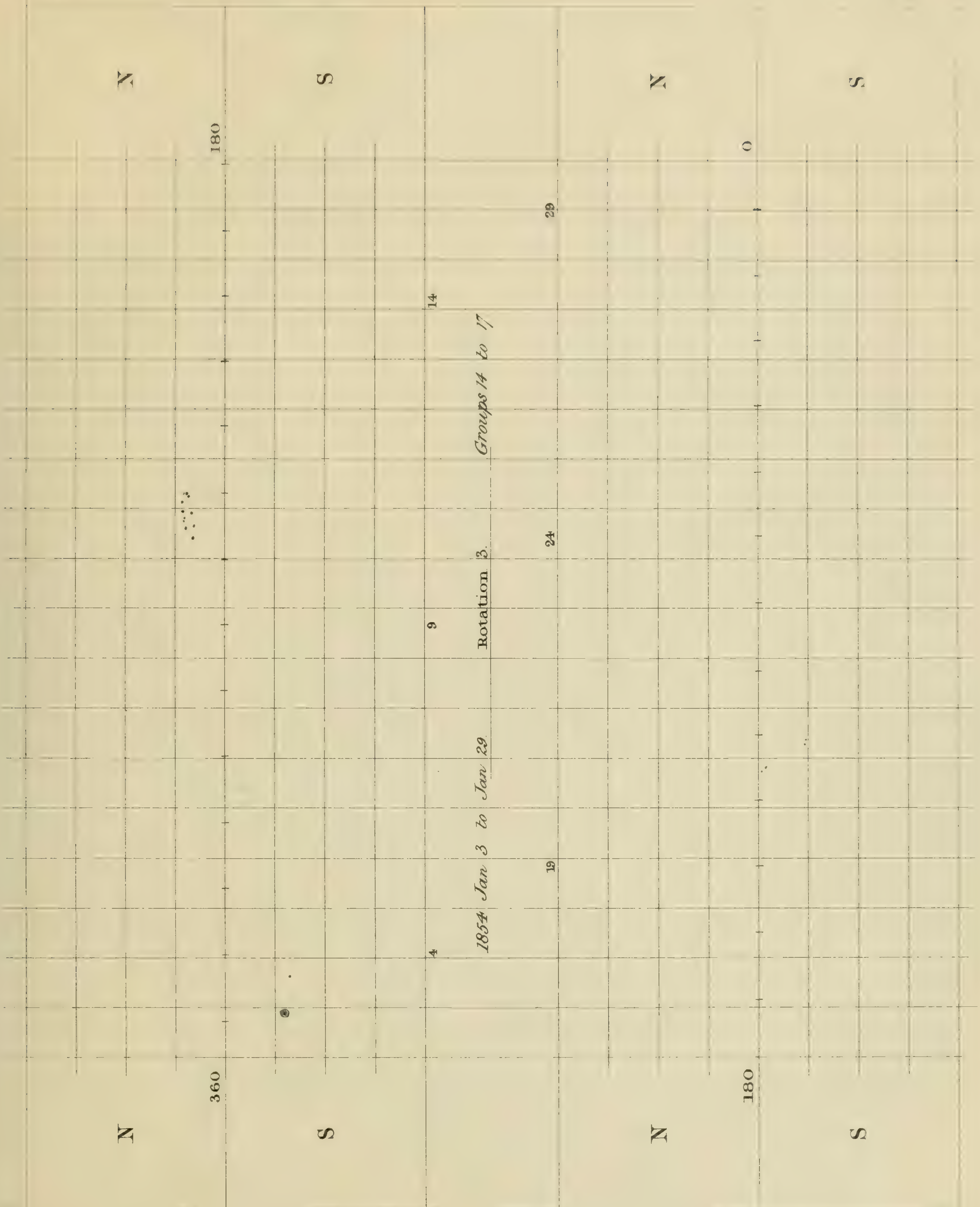

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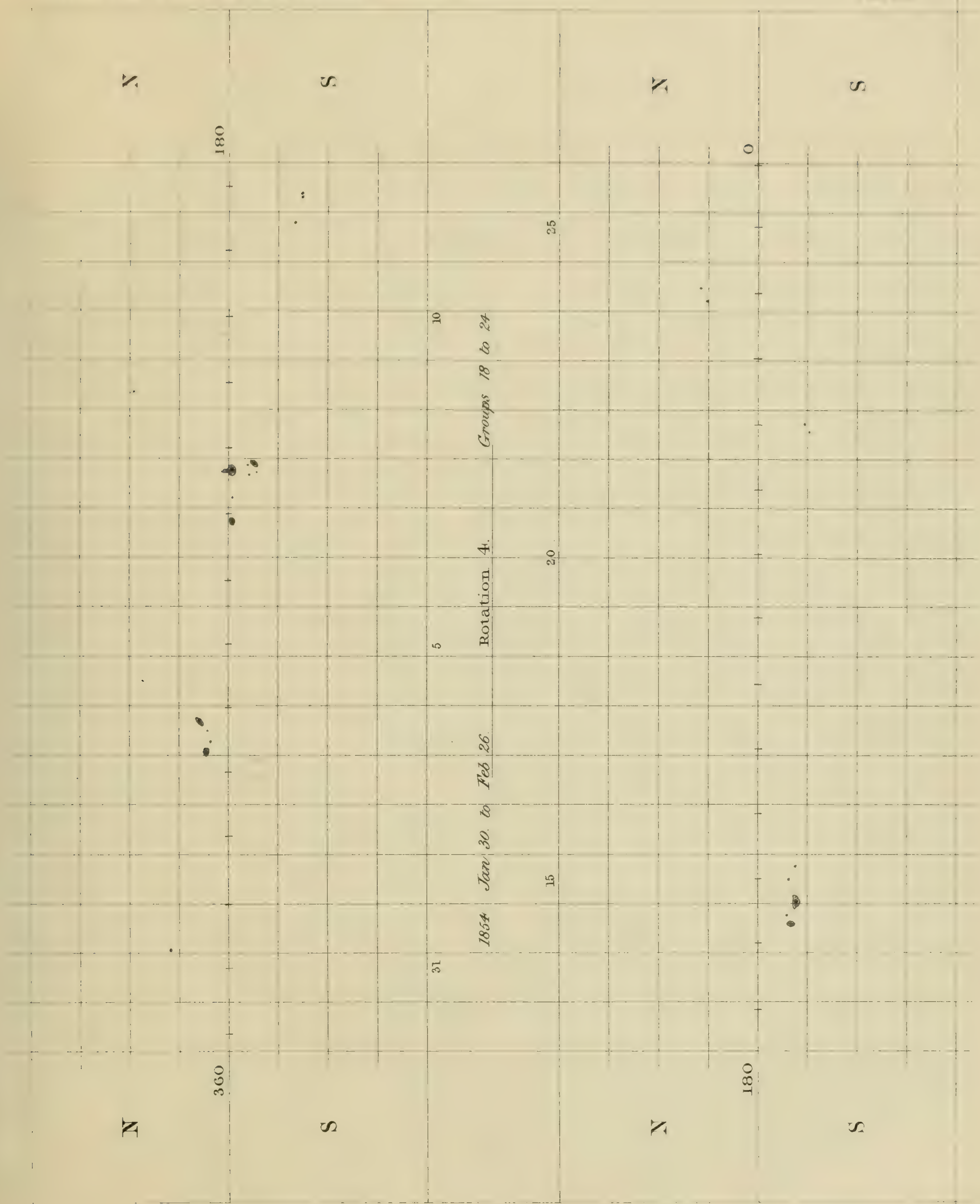
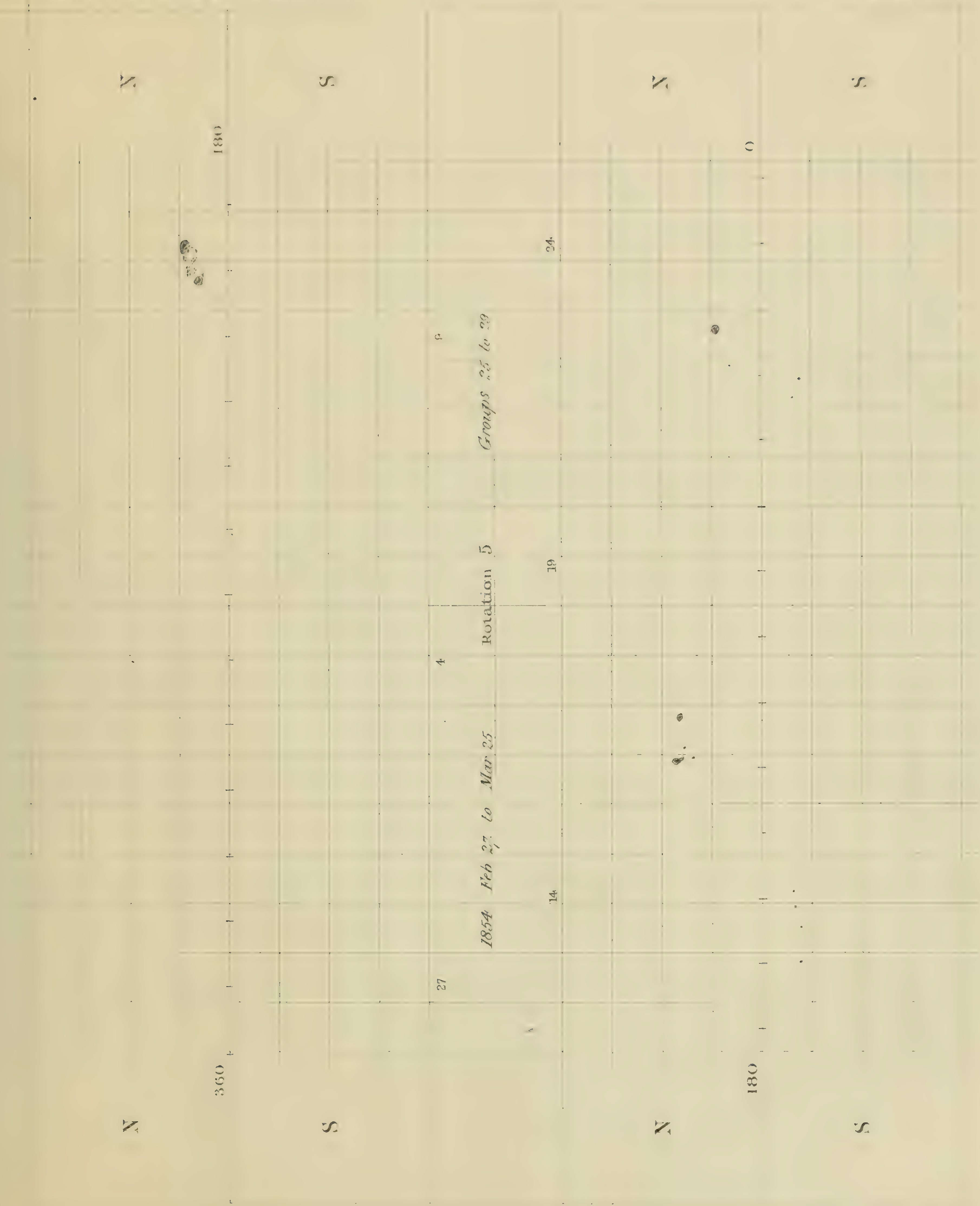
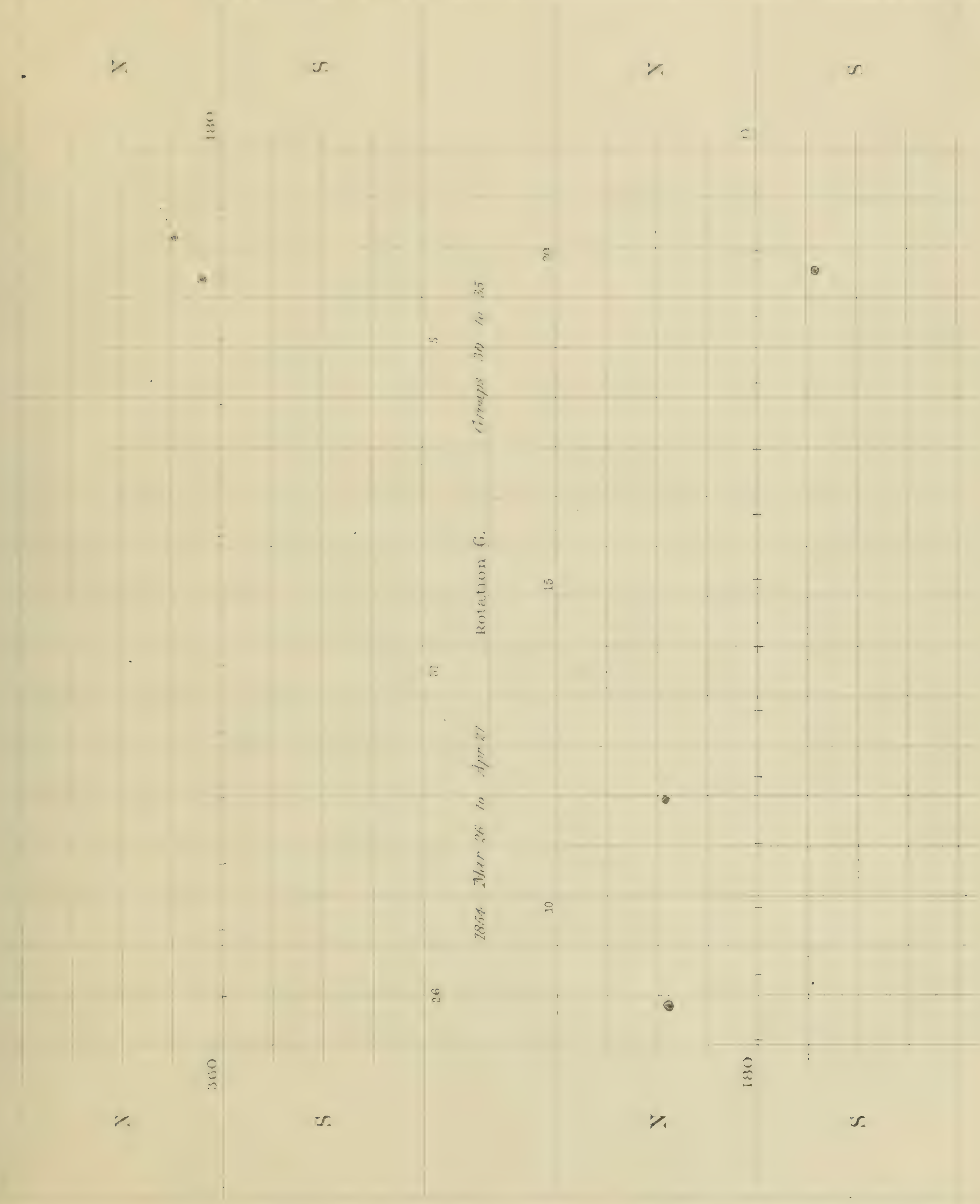
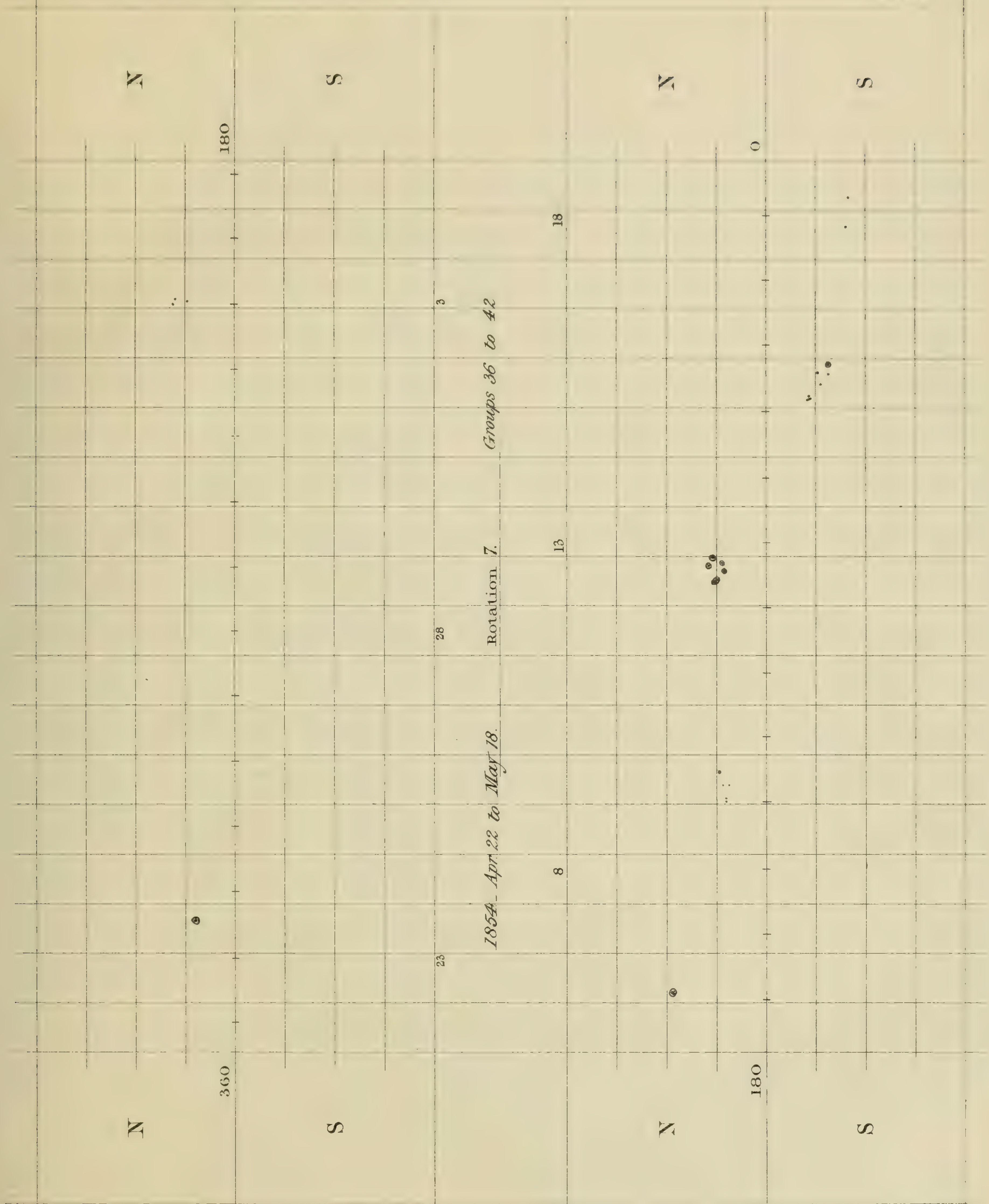

1854 Jan 30 to Feb 26 Rotation 4. Groups 18 to 24
N
S
180
0
360
25
20
15
10
5
31

R. C. C. Del.


N
S
N
S
180
0
24
19
14
9
4
27
1854 Feb 27 to Mar 25
Rotation 5
Groups 25 to 39
360
180
N
S
N
S


1854 Mar 26 to Apr 27
Rotation 6.
Groups 30 to 35
N
S
N
S
180
360
0
180
26
31
5
10
15
20



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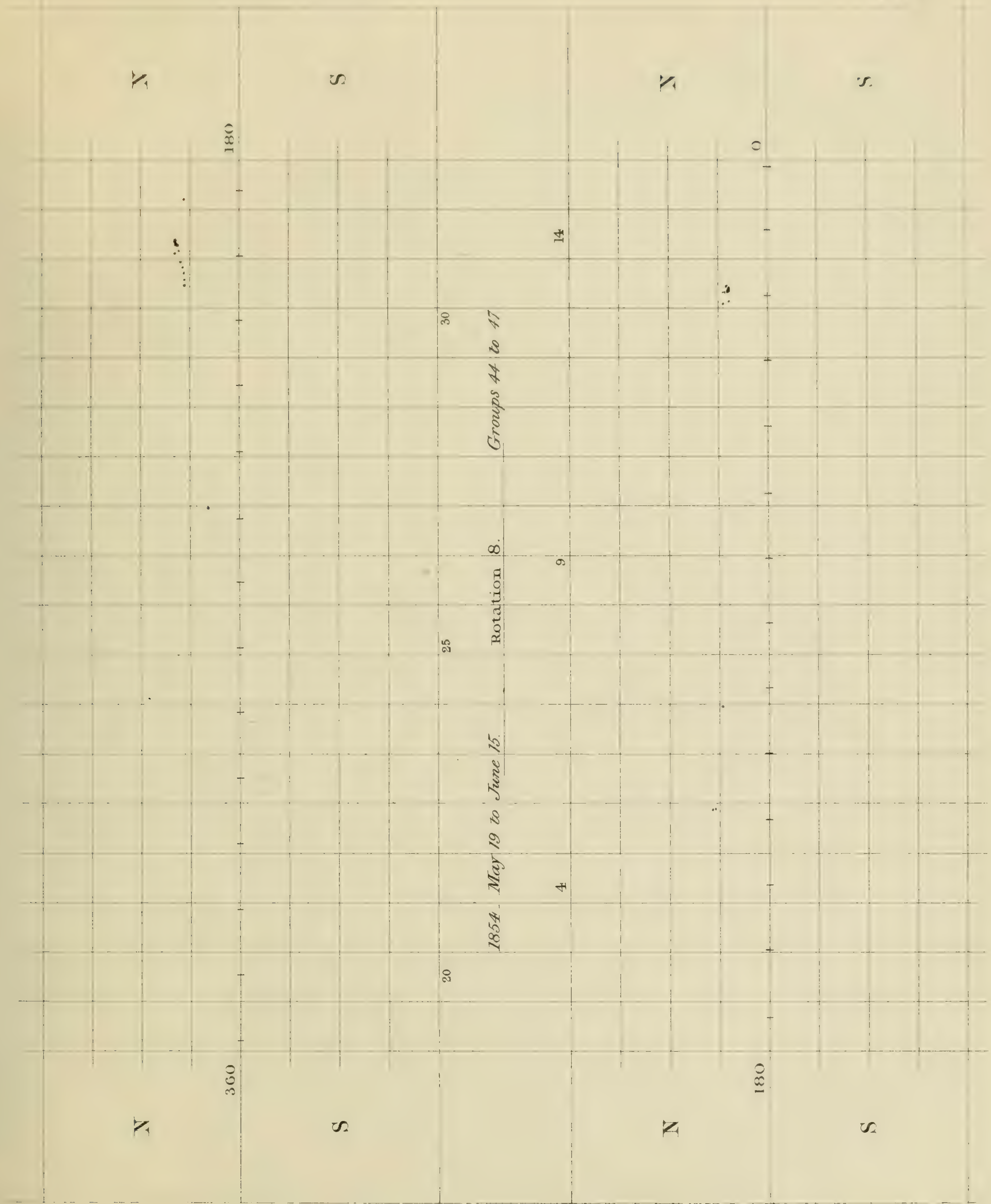
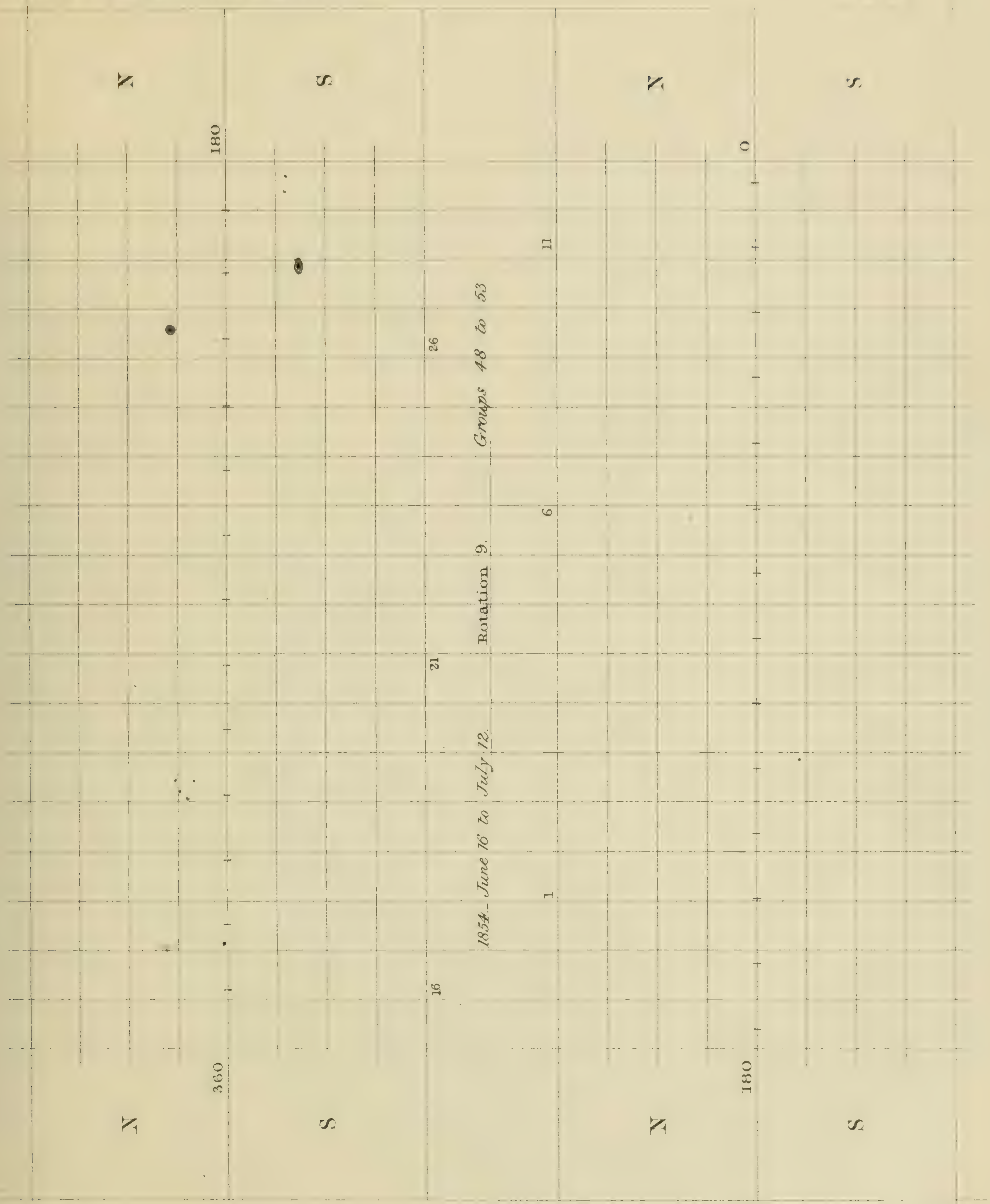
Fred.k Dangerfield Lith.



R C C Del

Fredk Bangerfield Lith



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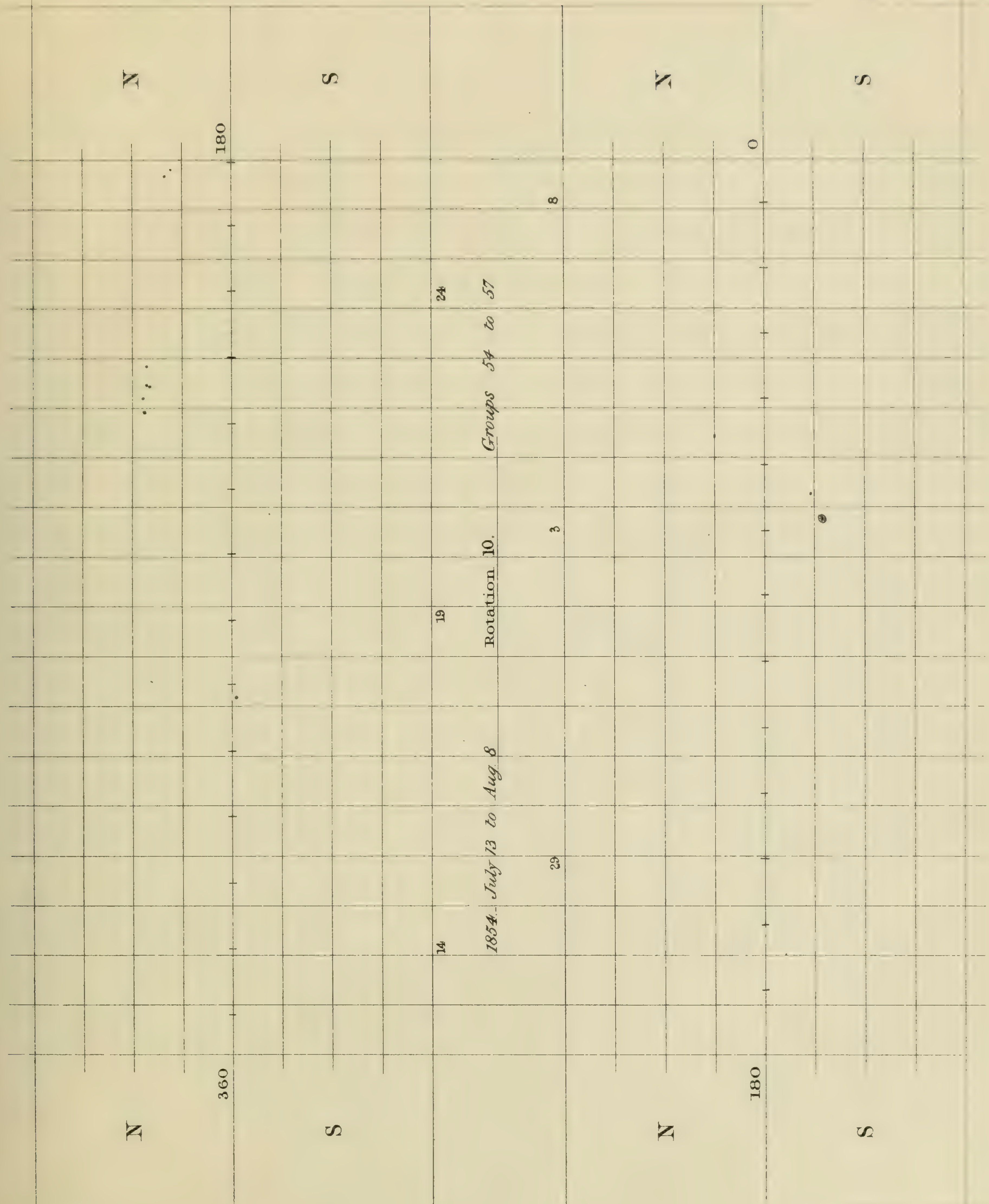

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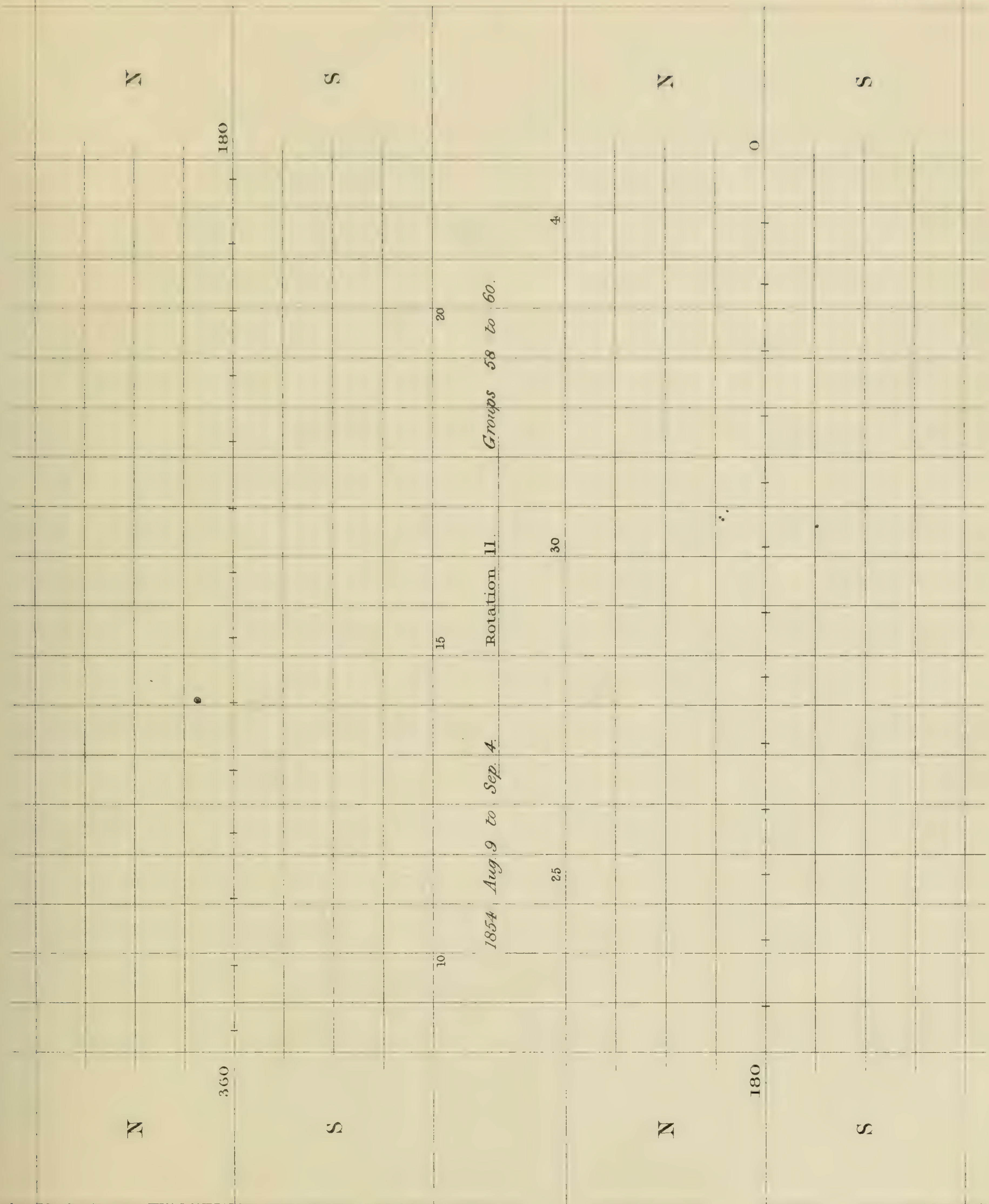
Fredk Dangerfield. Lith

Obs of Solar Spots by R. C. Carrington. Plate 13.



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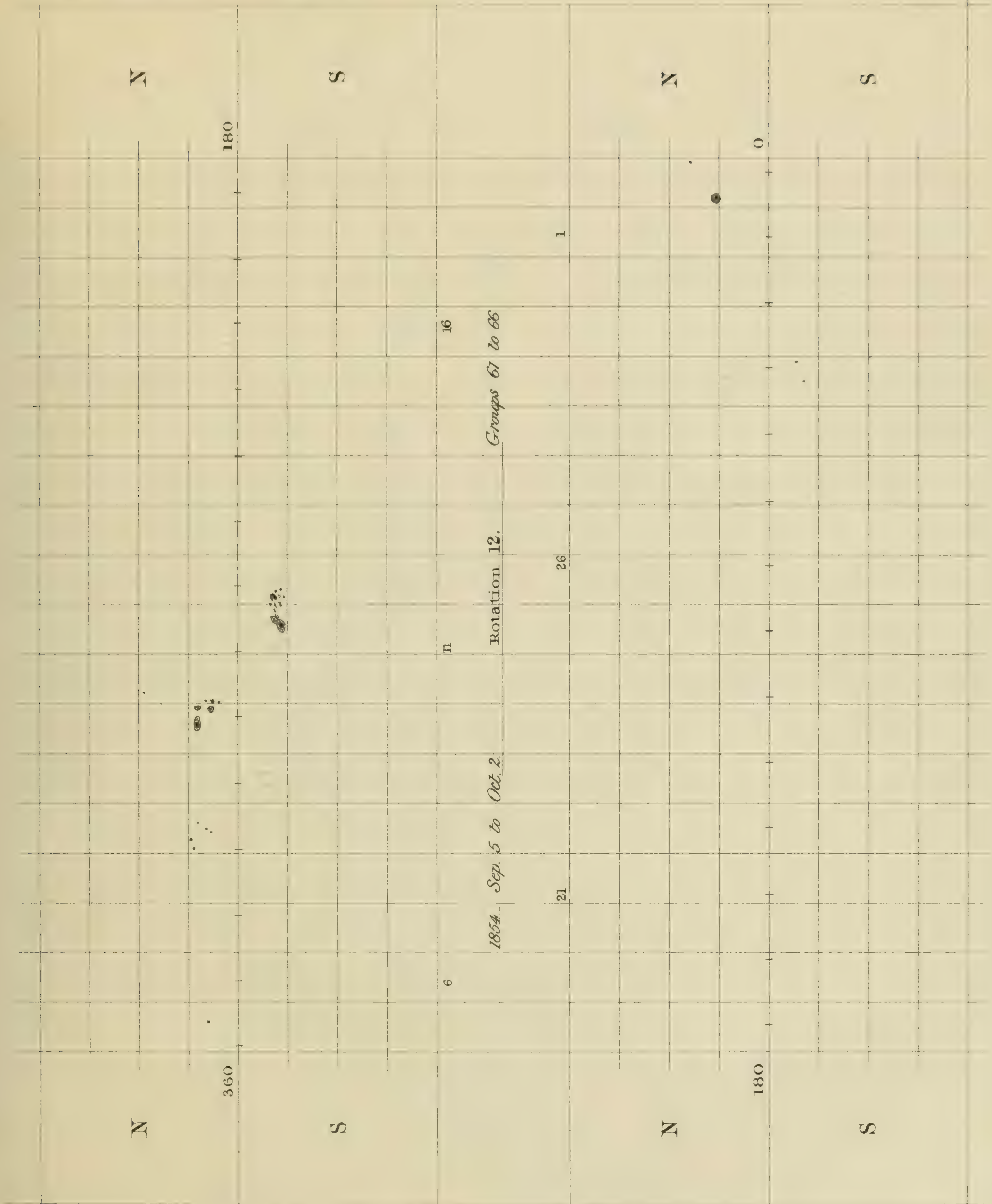
Fredk Dangerfield Lith.



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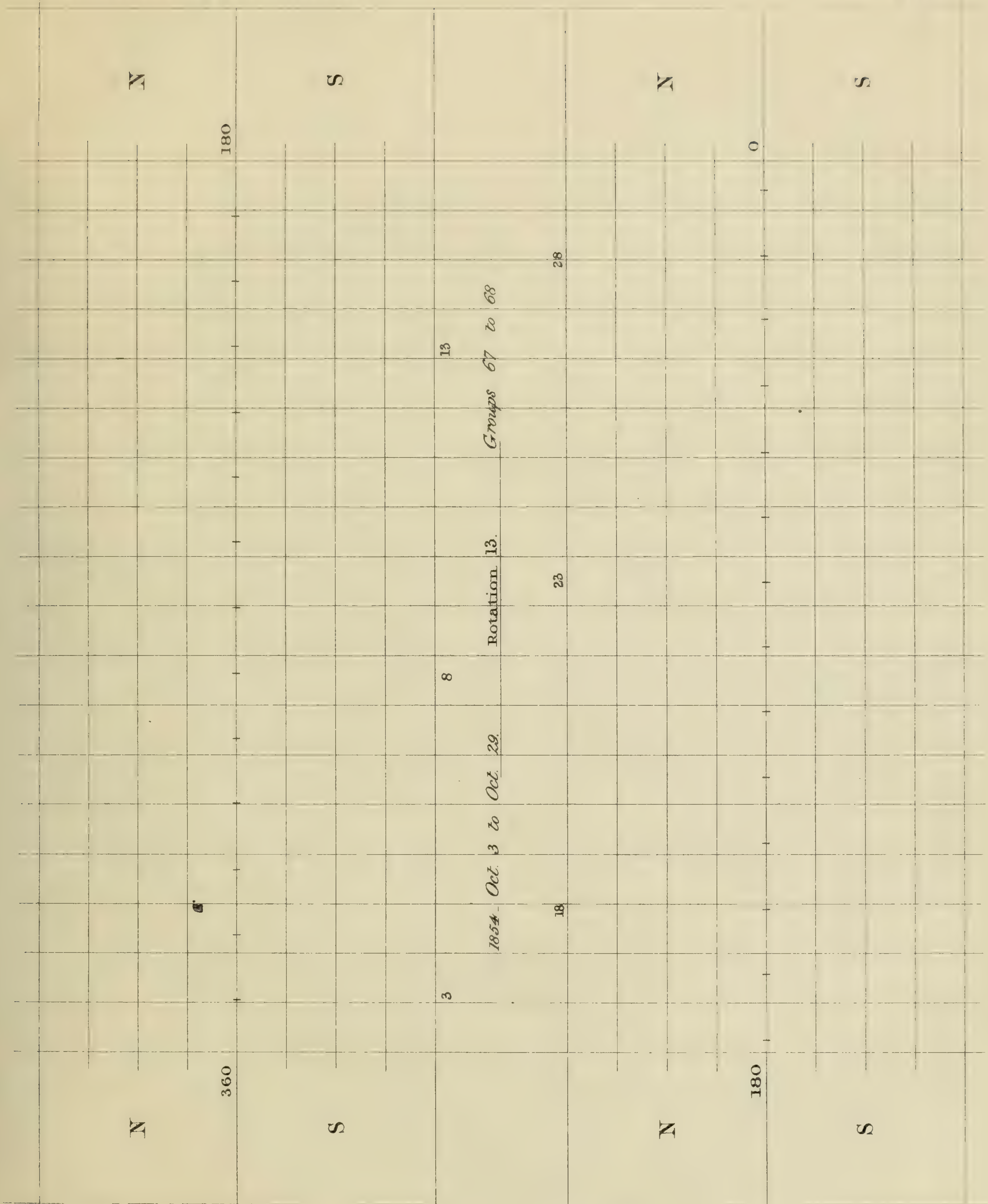

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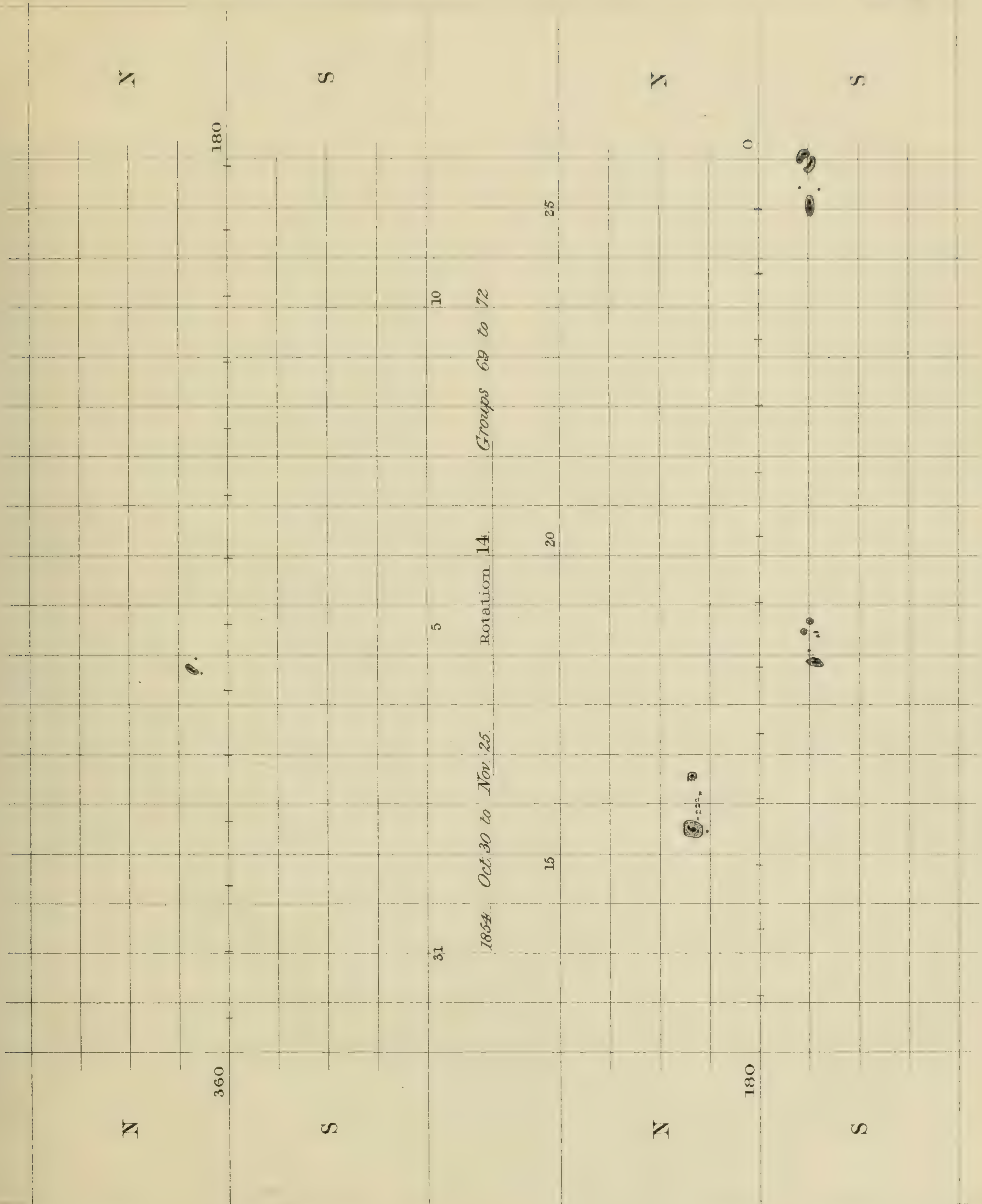

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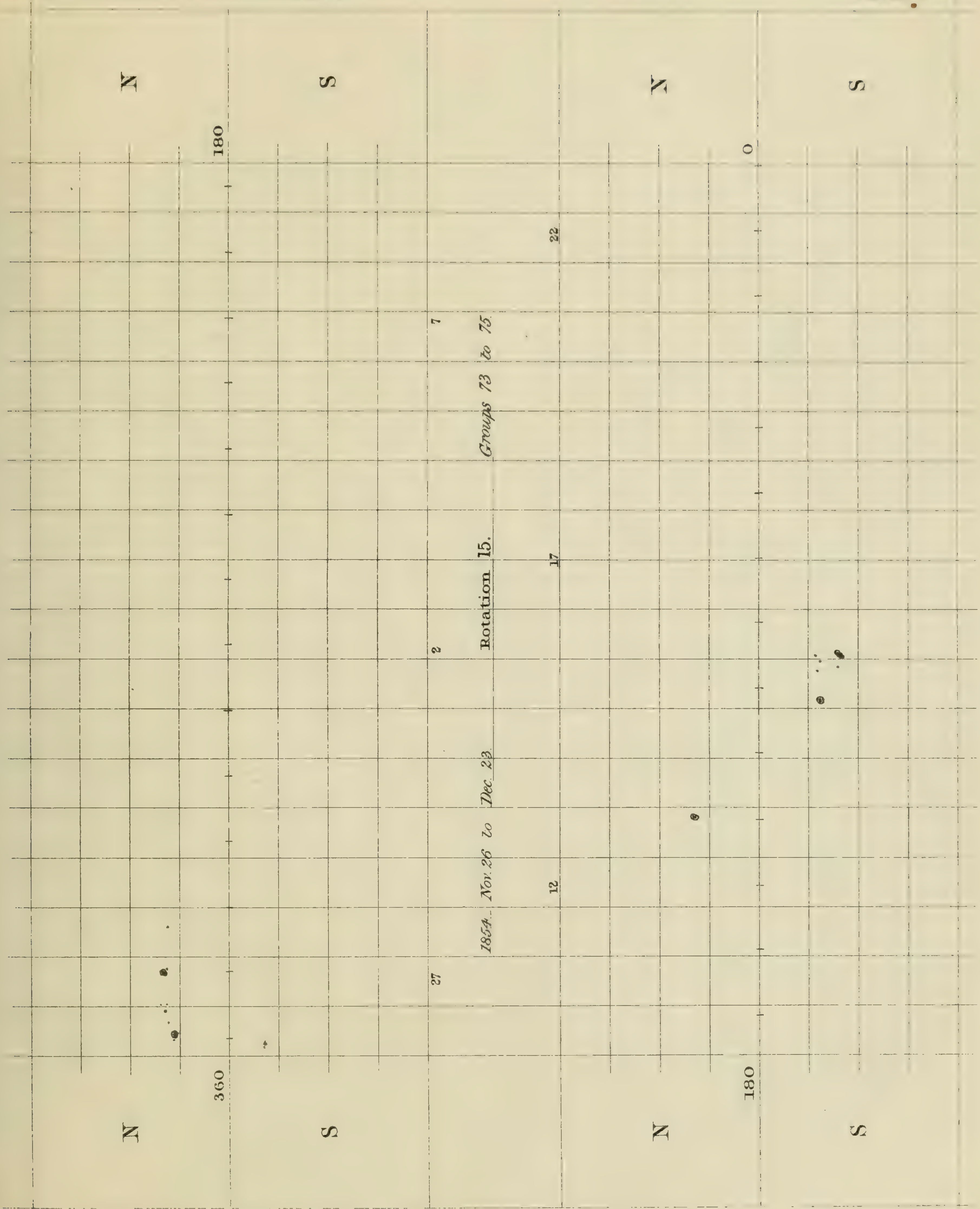

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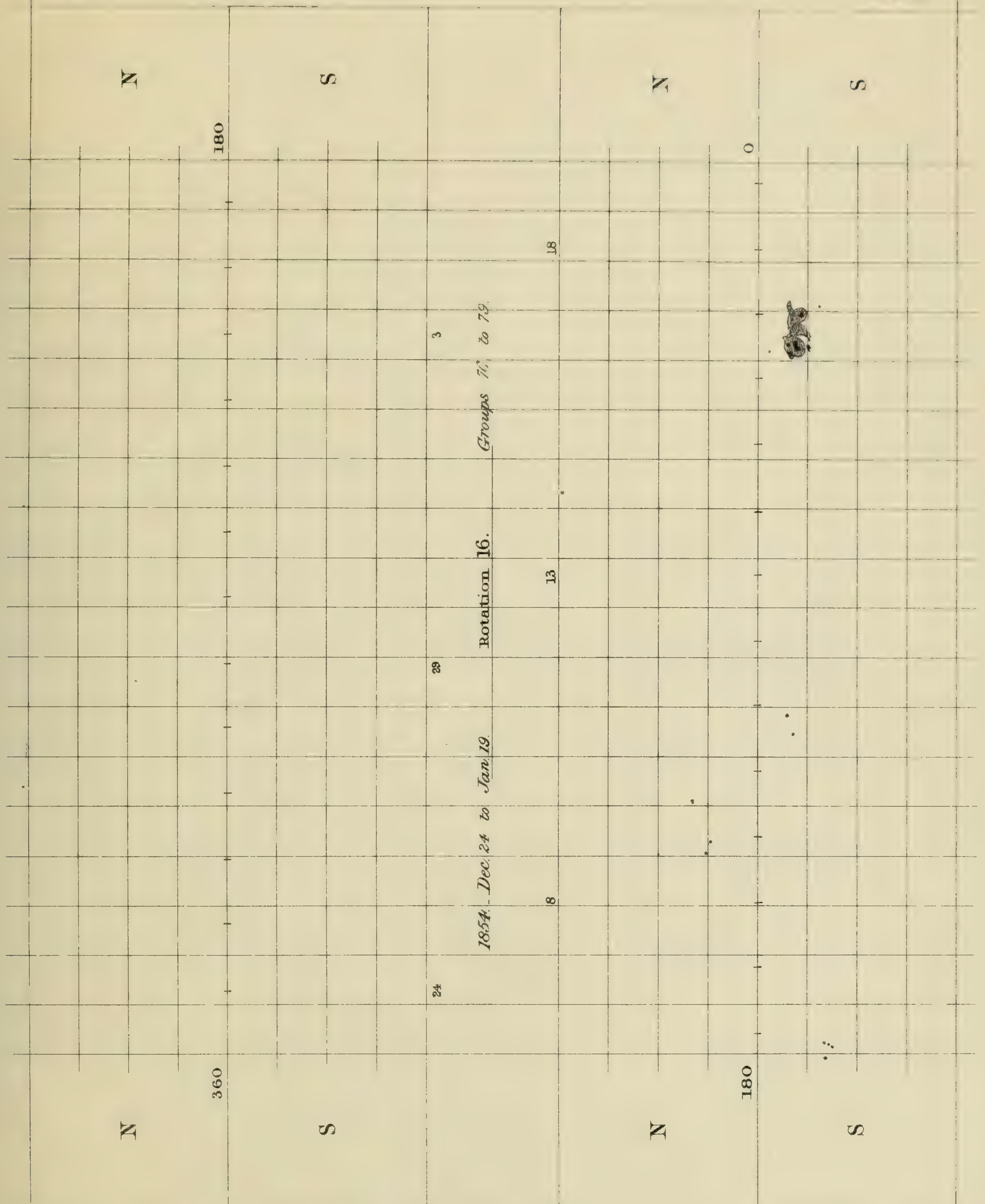

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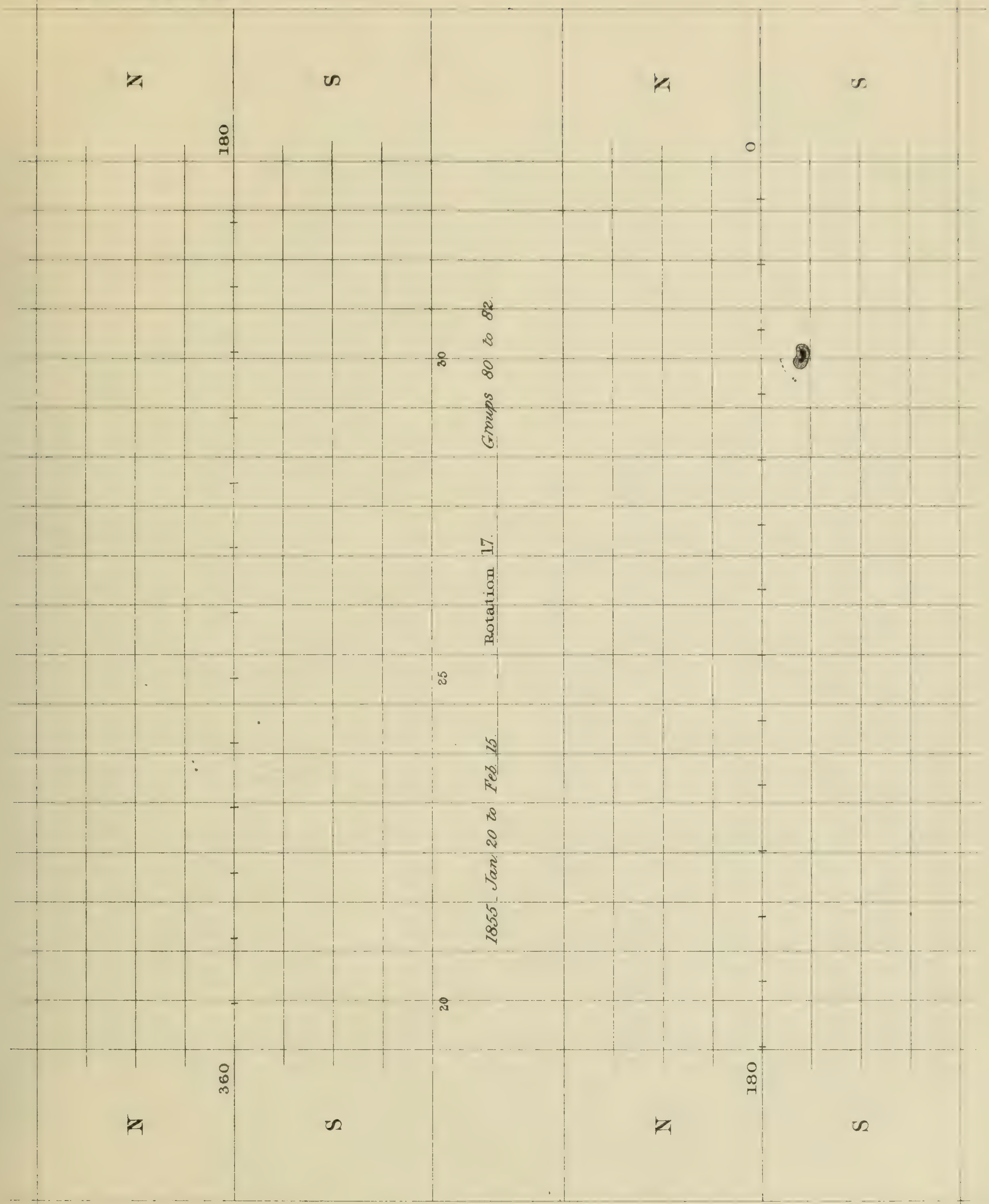

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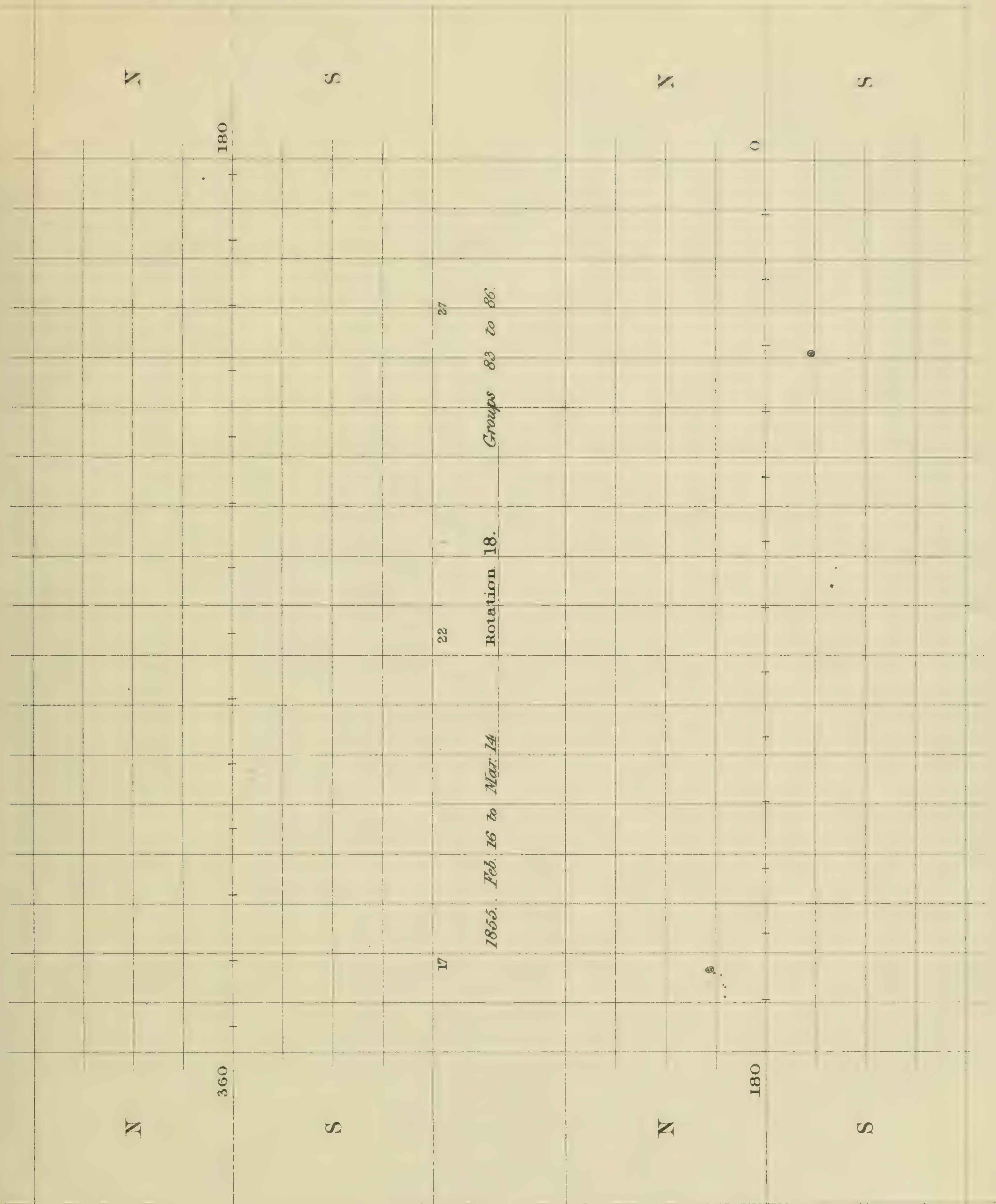

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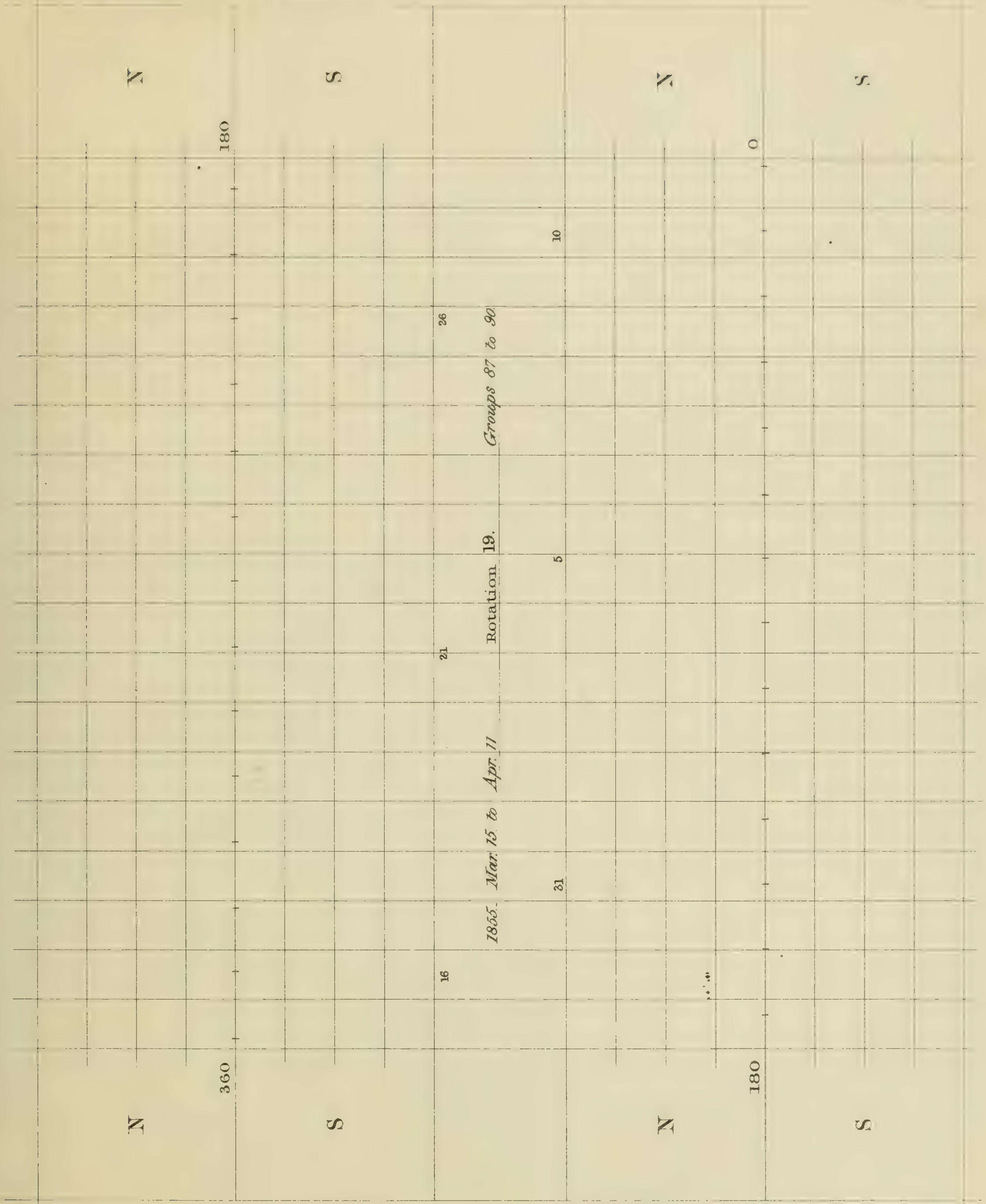

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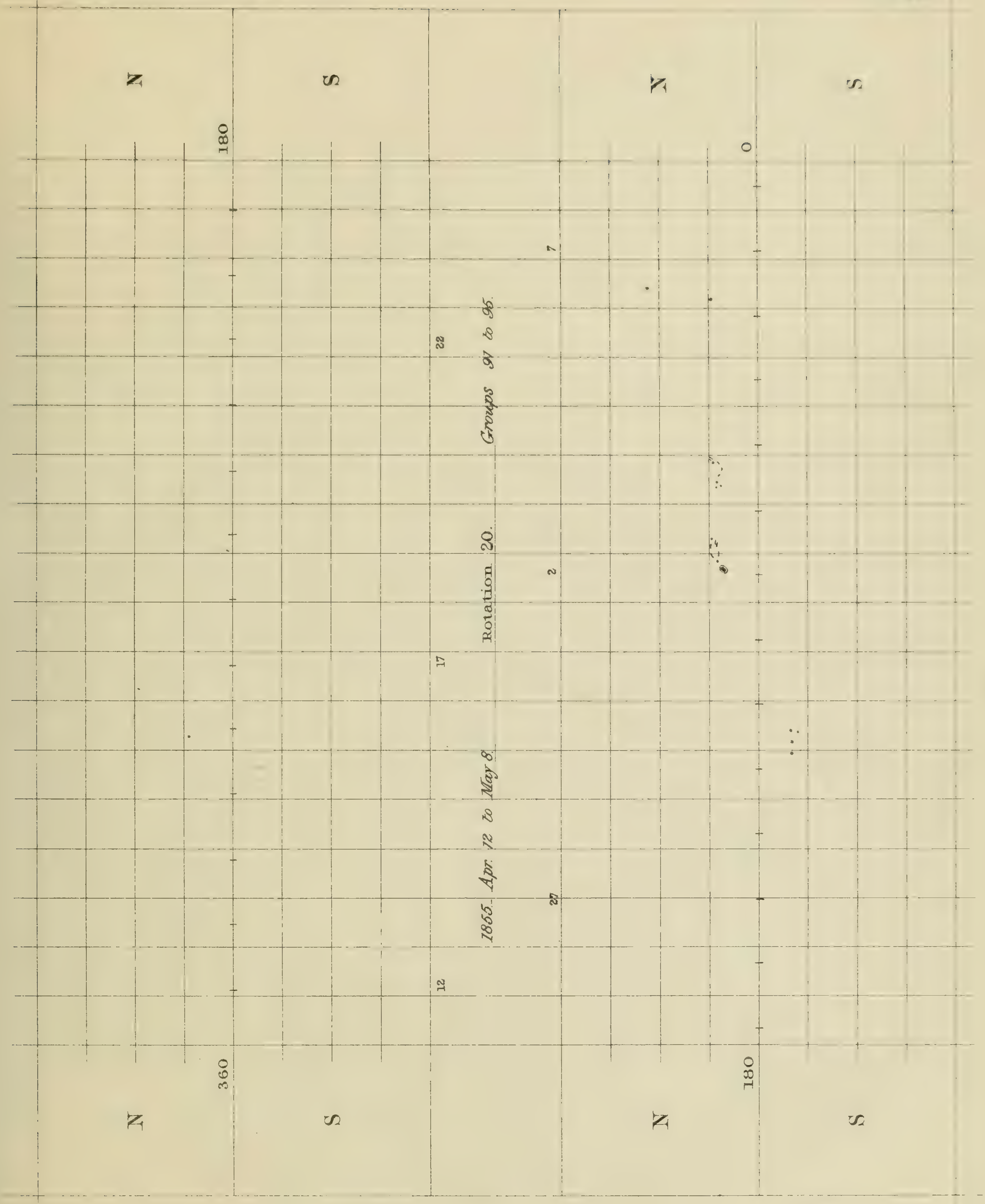
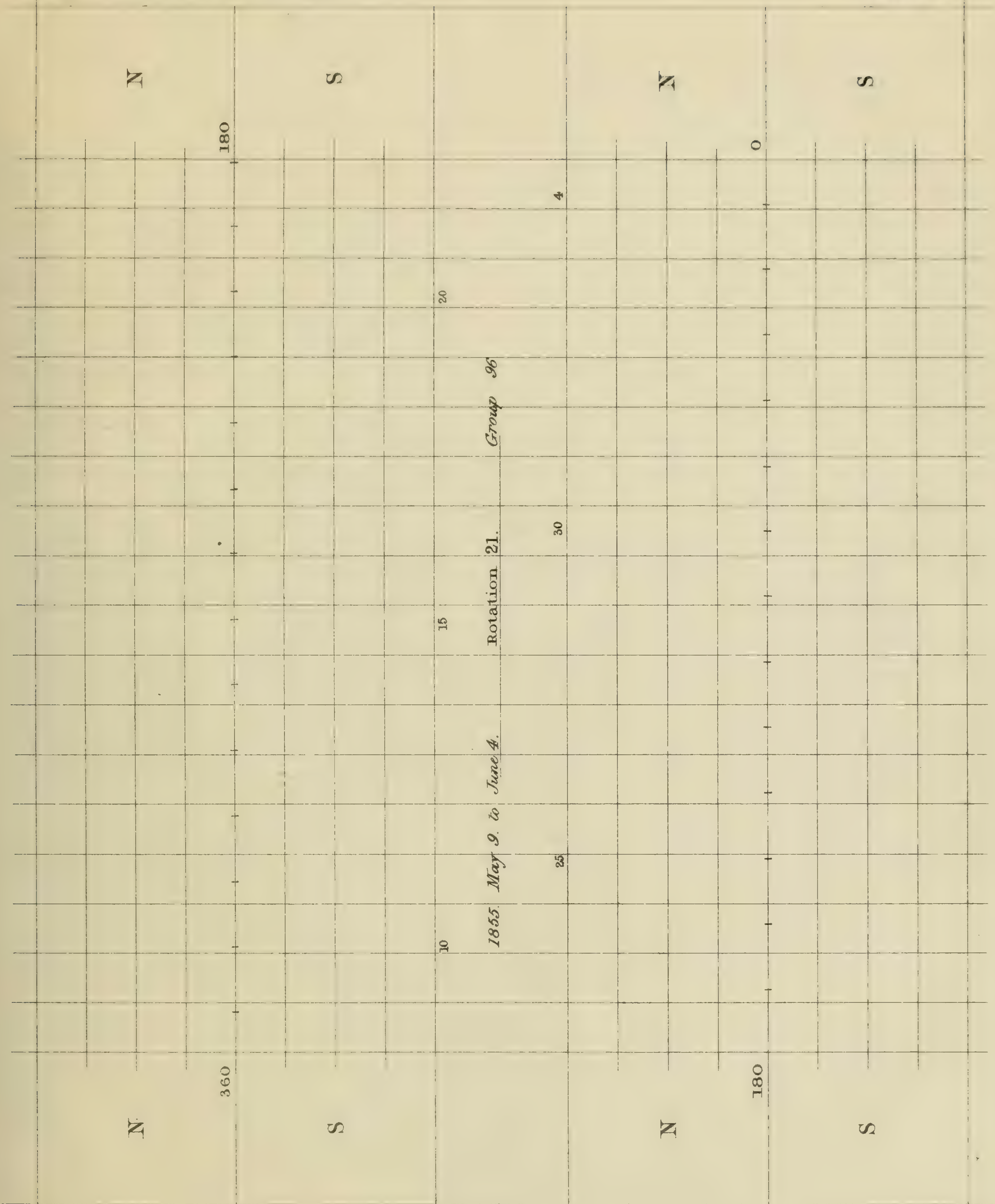


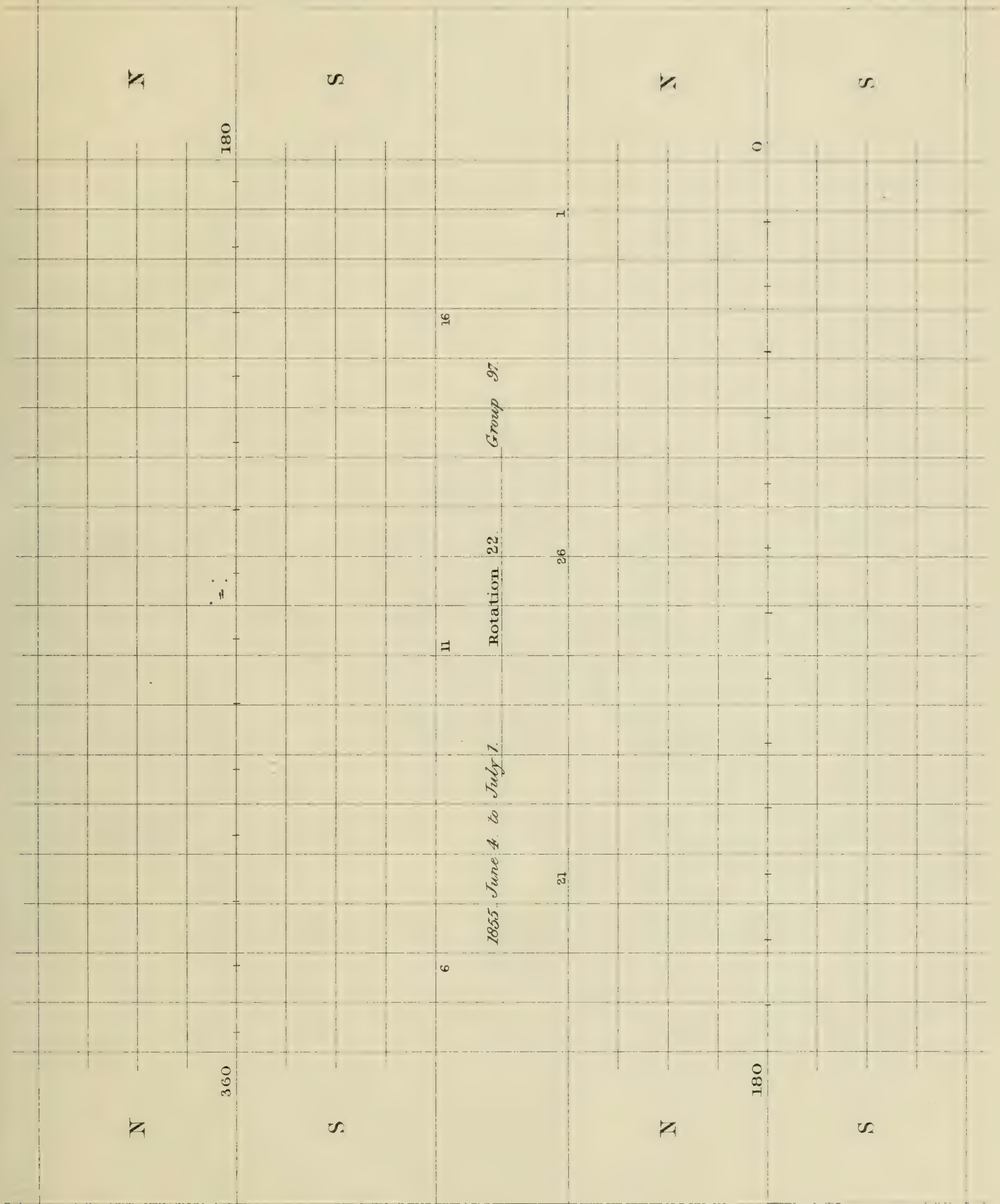
R. C. C. Del.

Fredk Dangerfield Lith.



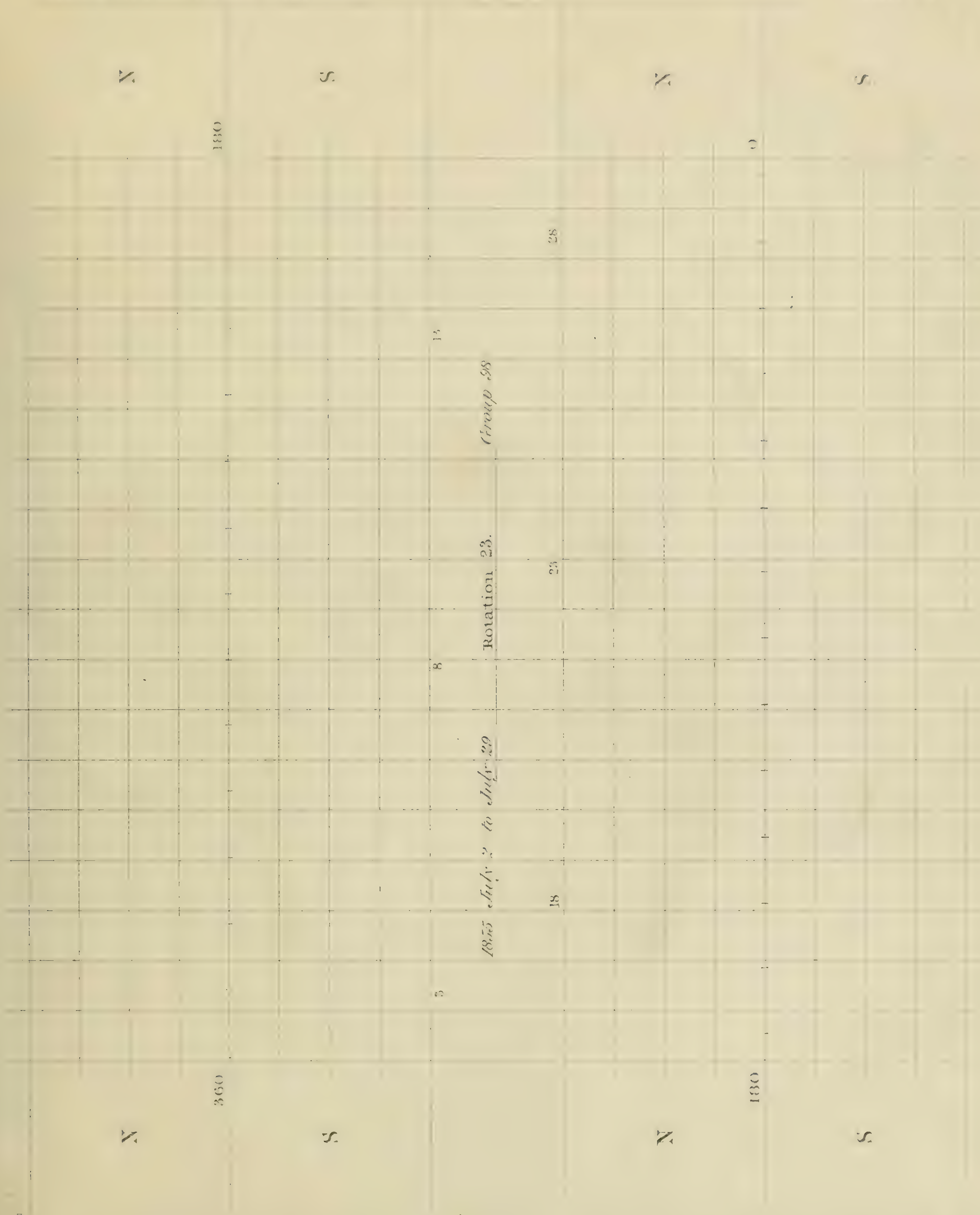
R. C. C. Del.

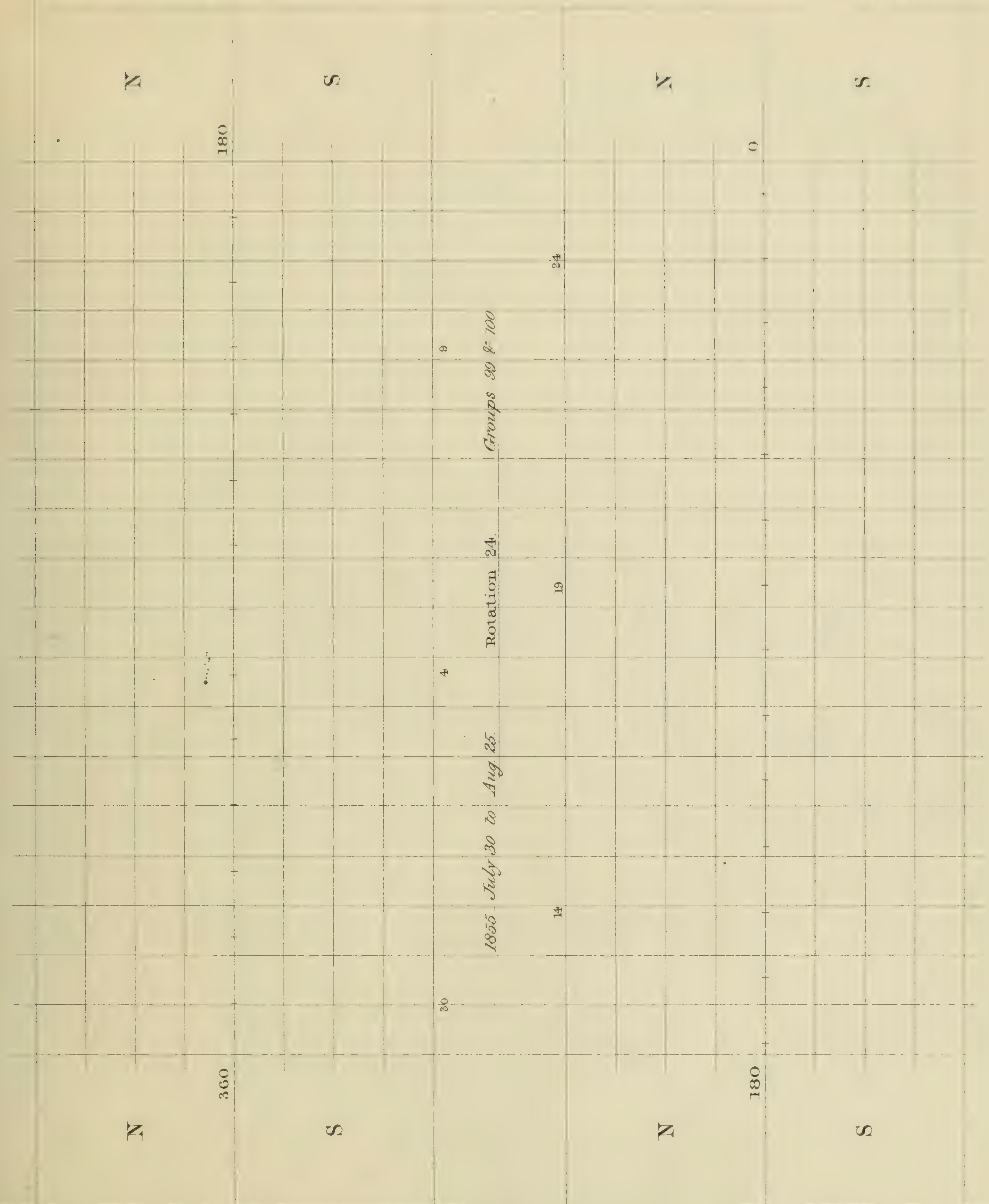
Fredk. Dangerfield Lith.



R. C. C. Del.

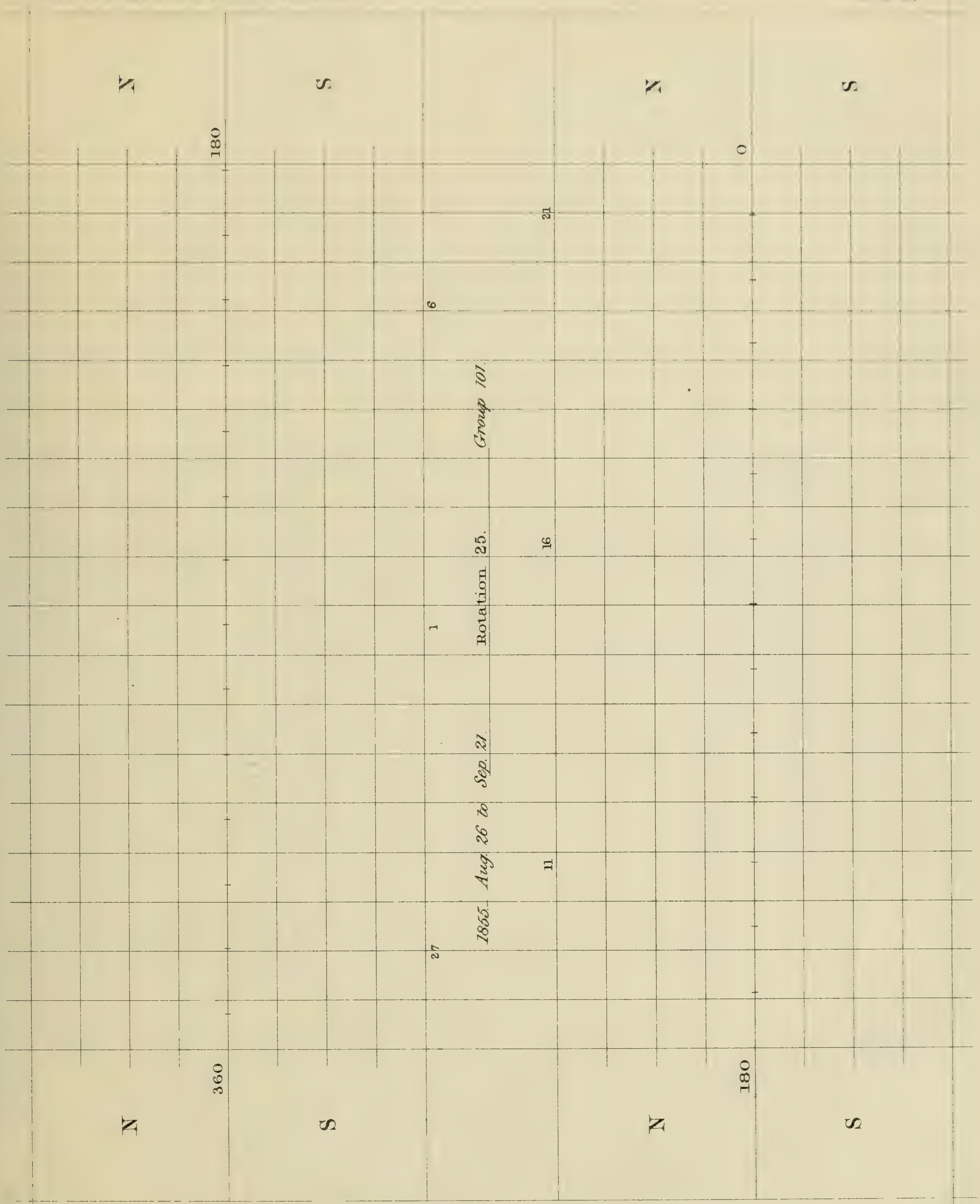
Fred^k Dangerfield. Lith.


N.
S.
N.
S.
180
0
28
13
Group 98
Rotation 23.
23
8
1855 July 2 to July 29
18
3
360
180
N.
S.
N.
S.



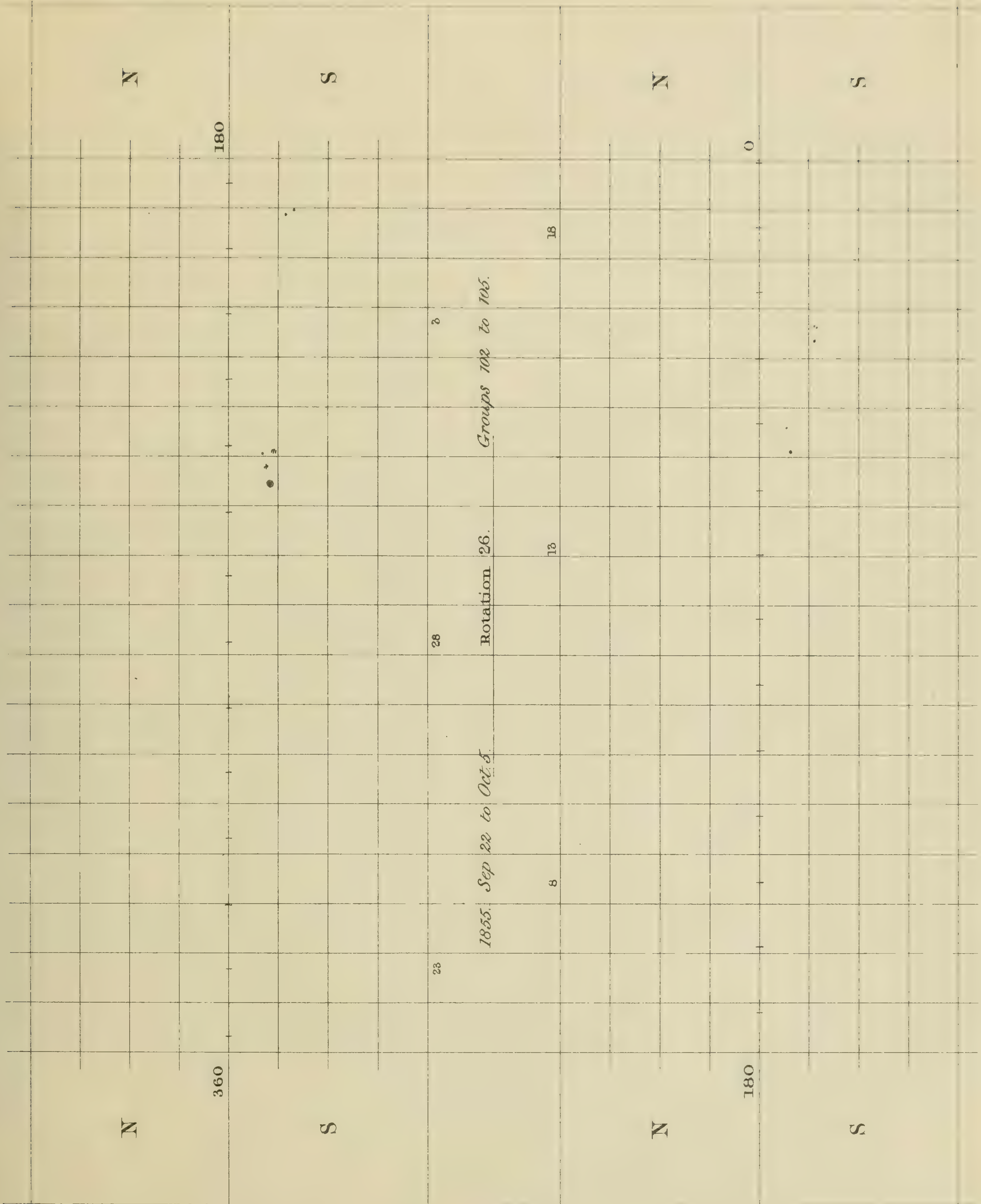
R. C. C. Del.

Fredk Bangerfield, Lith.

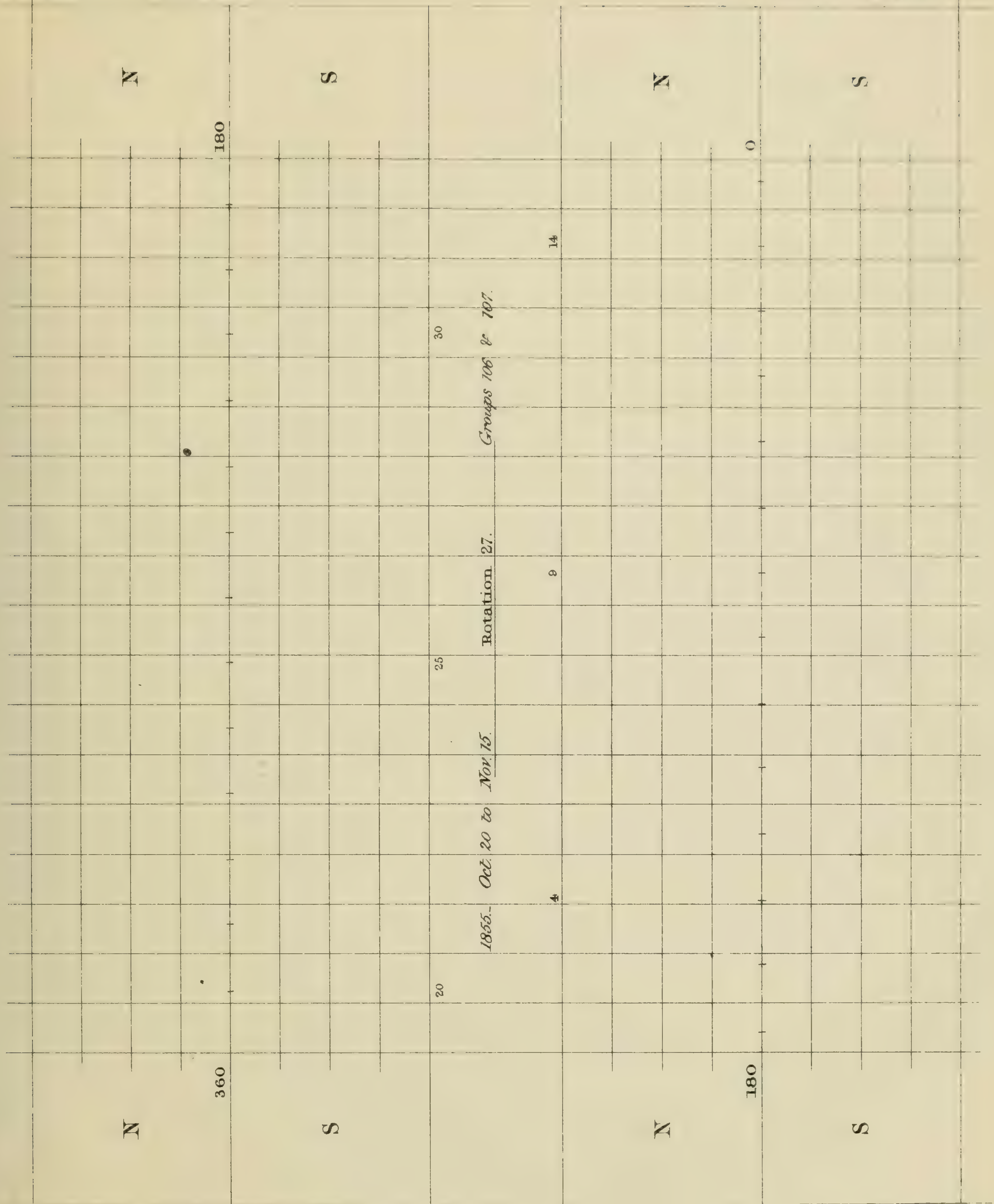


R. C. C. Del.

Fredk Dangerfield. Lith.

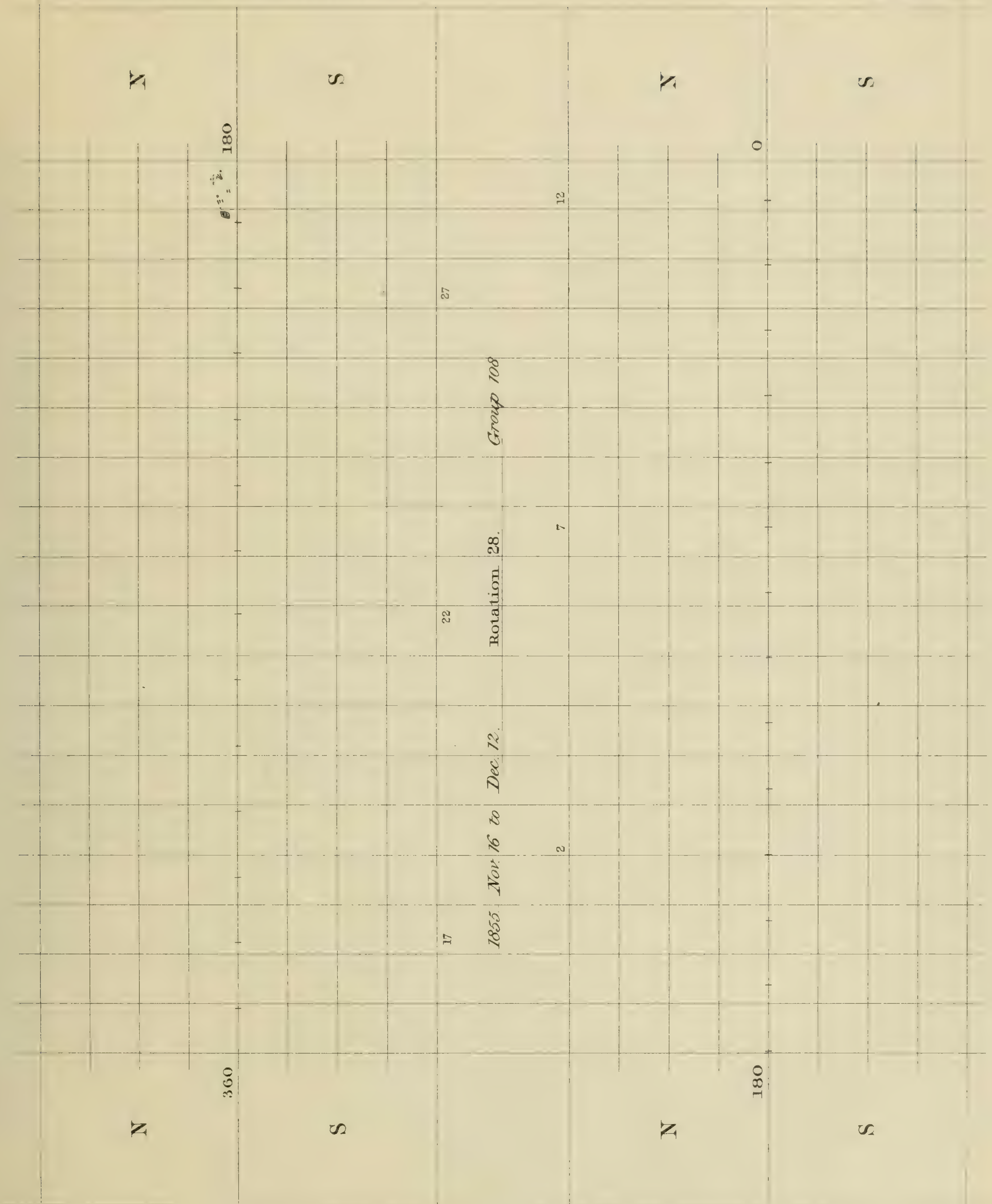

N
S
N
S
180
0
1855. Sep 22 to Oct 5. Rotation 26. Groups 102 to 105.
360
180
N
S
N
S

R. C. C. Del.



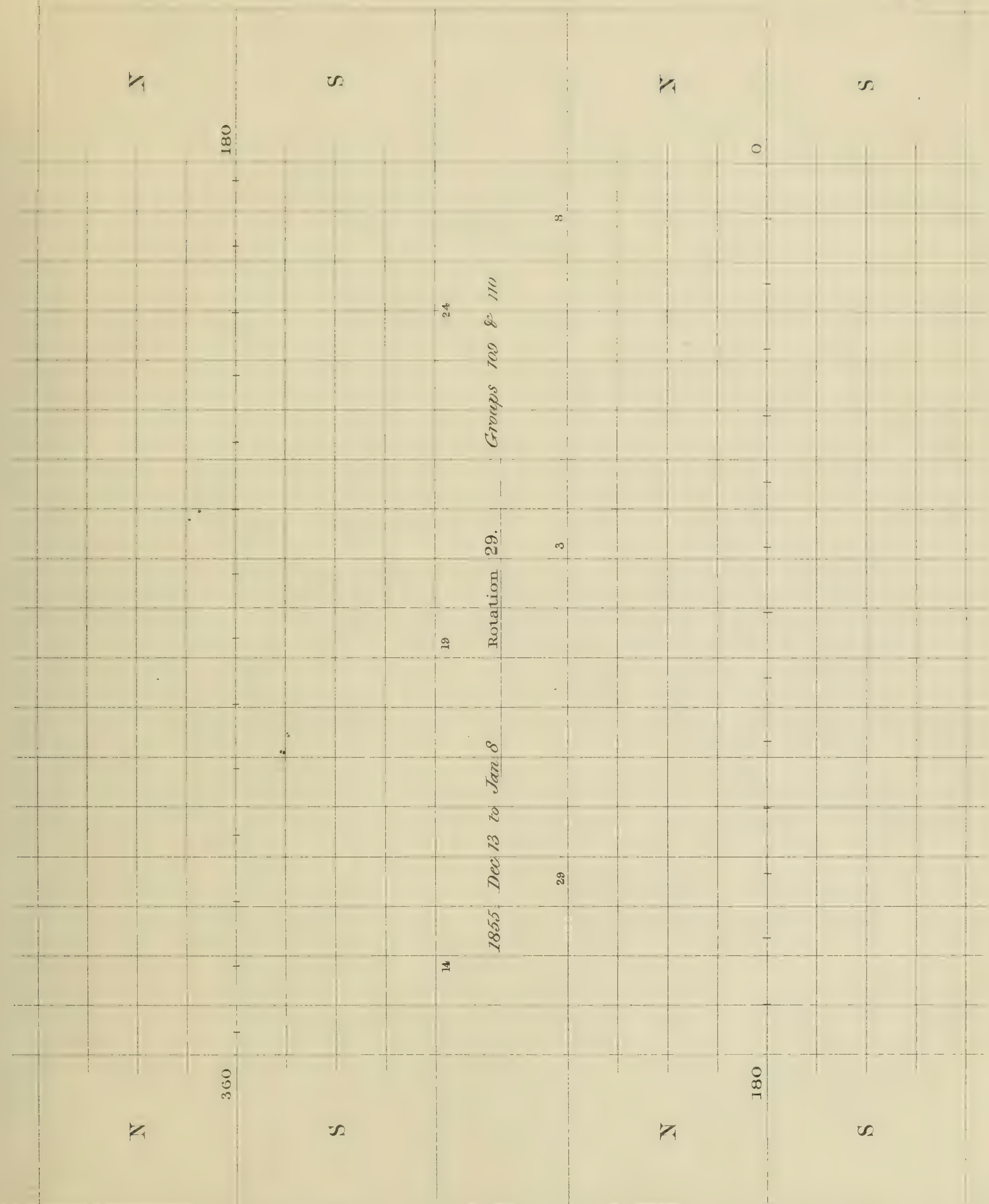
R. C. C. Del.

Fredk Dangerfield Lith.



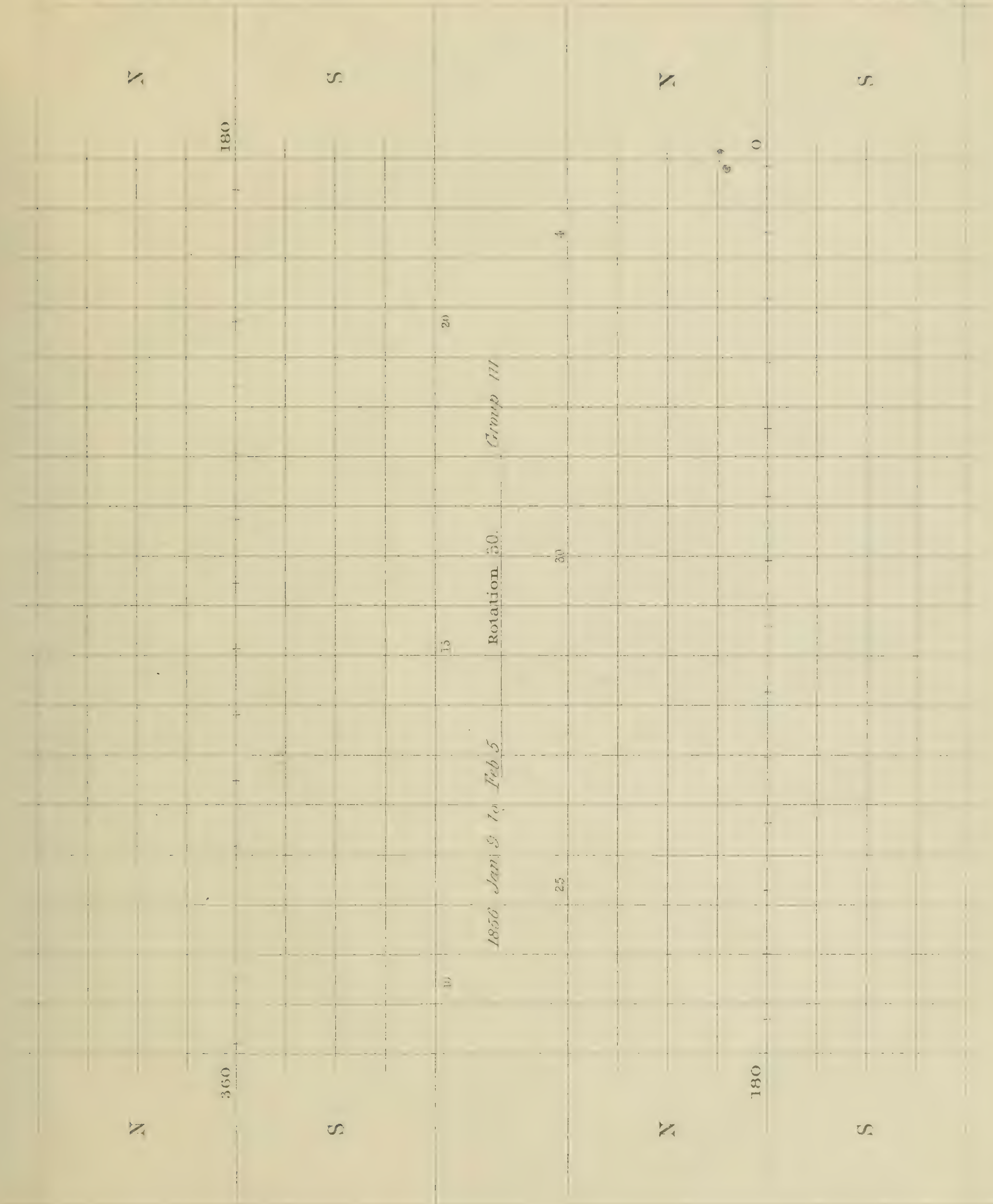
R C C Del.

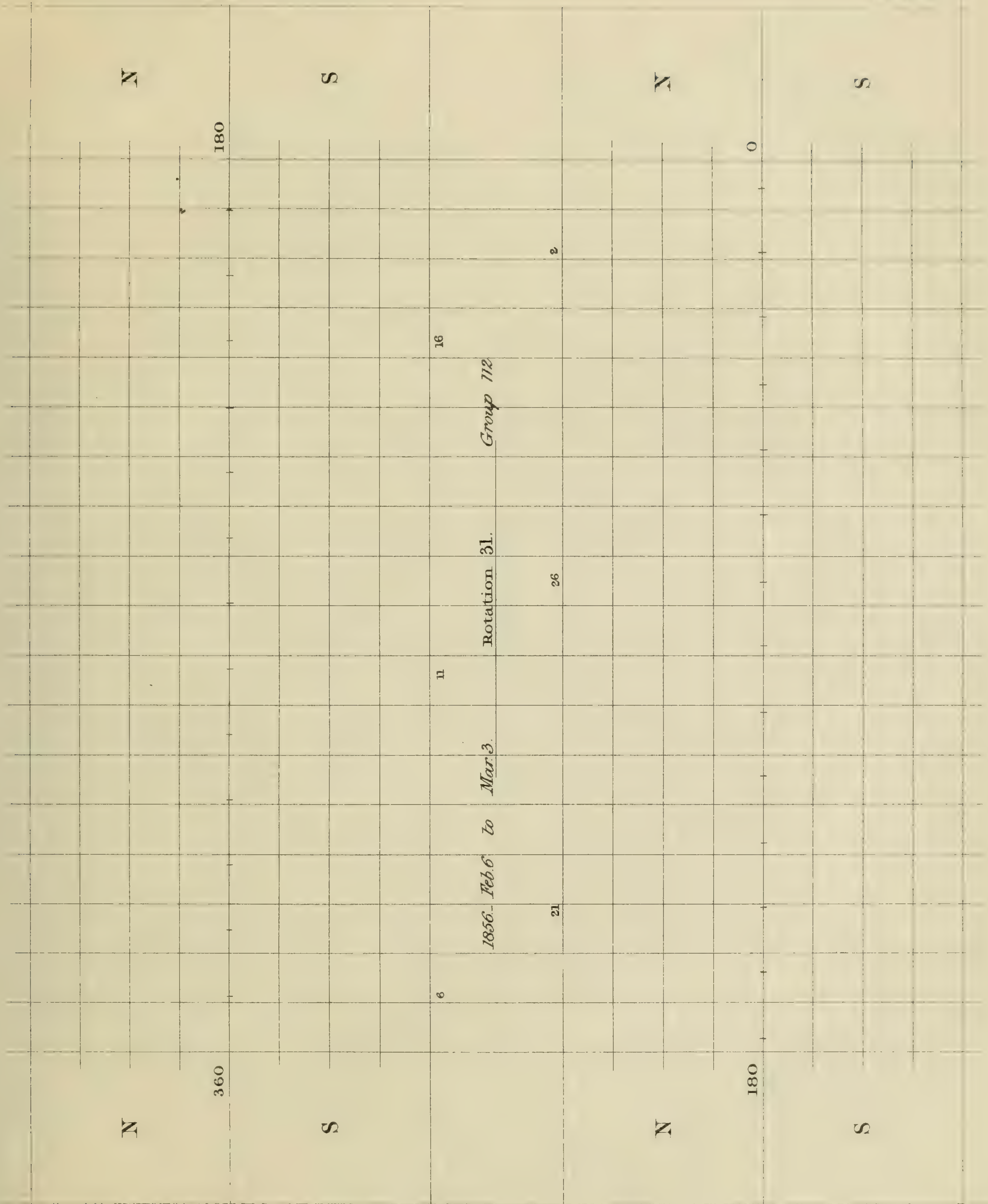
Fredk Dangerfield Lith



R. C. C. Del

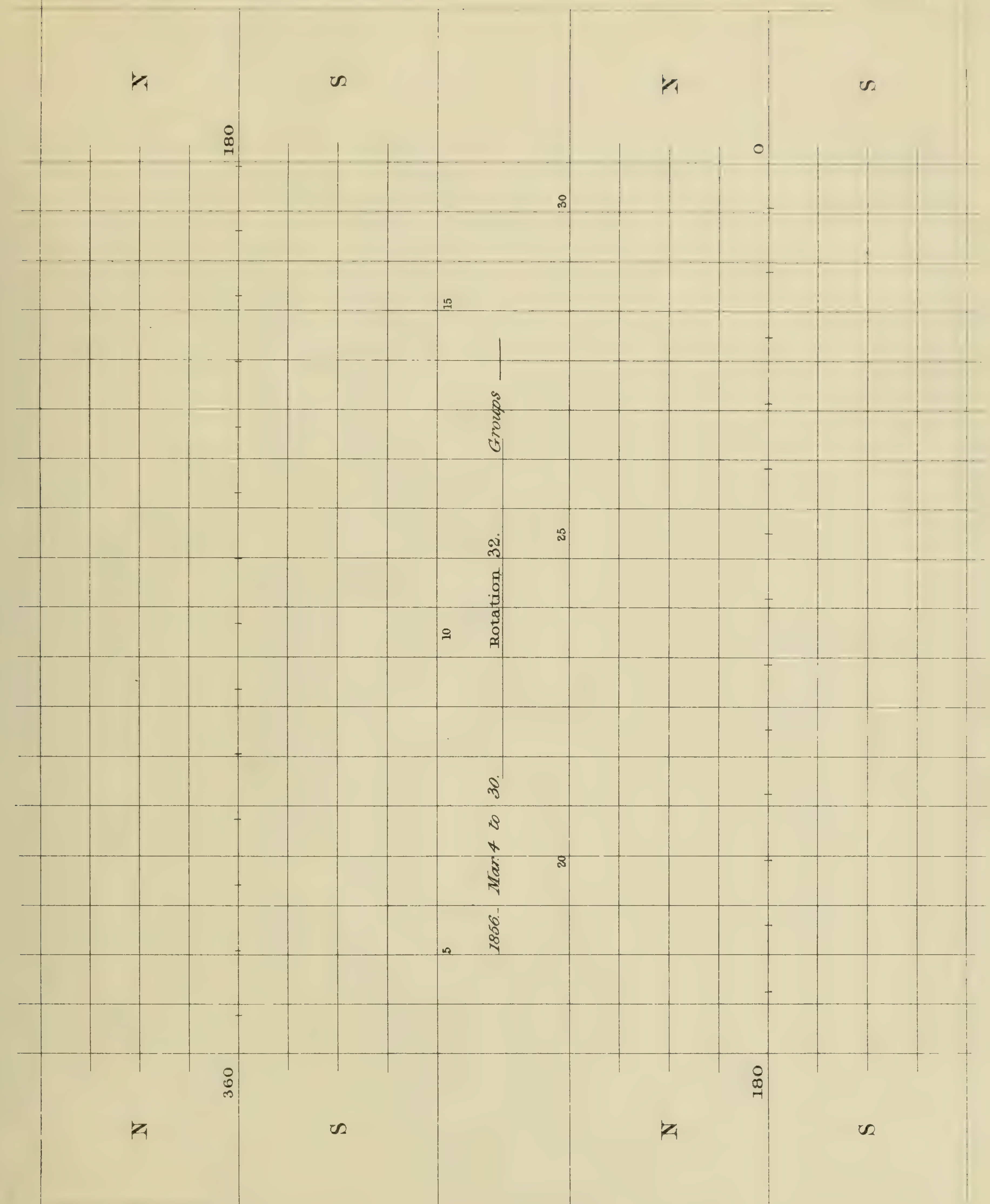
Fredk Dangerfield Lith


N
S
N
S
180
0
360
180
1856 Jan 9 to Feb 5
Rotation 30.
N
S
N
S



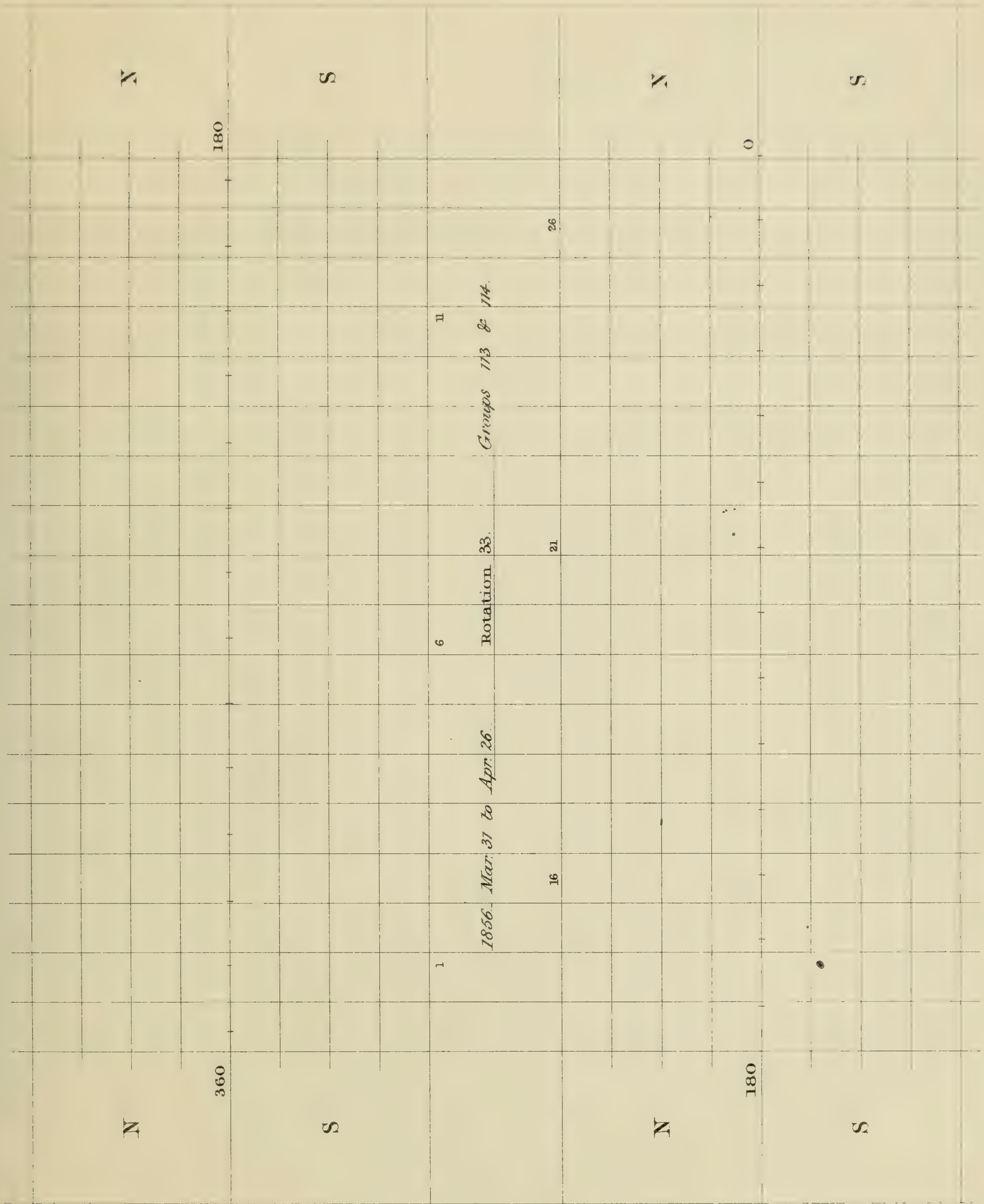
R C C Del.

Fred^k Dangerfield Lith.

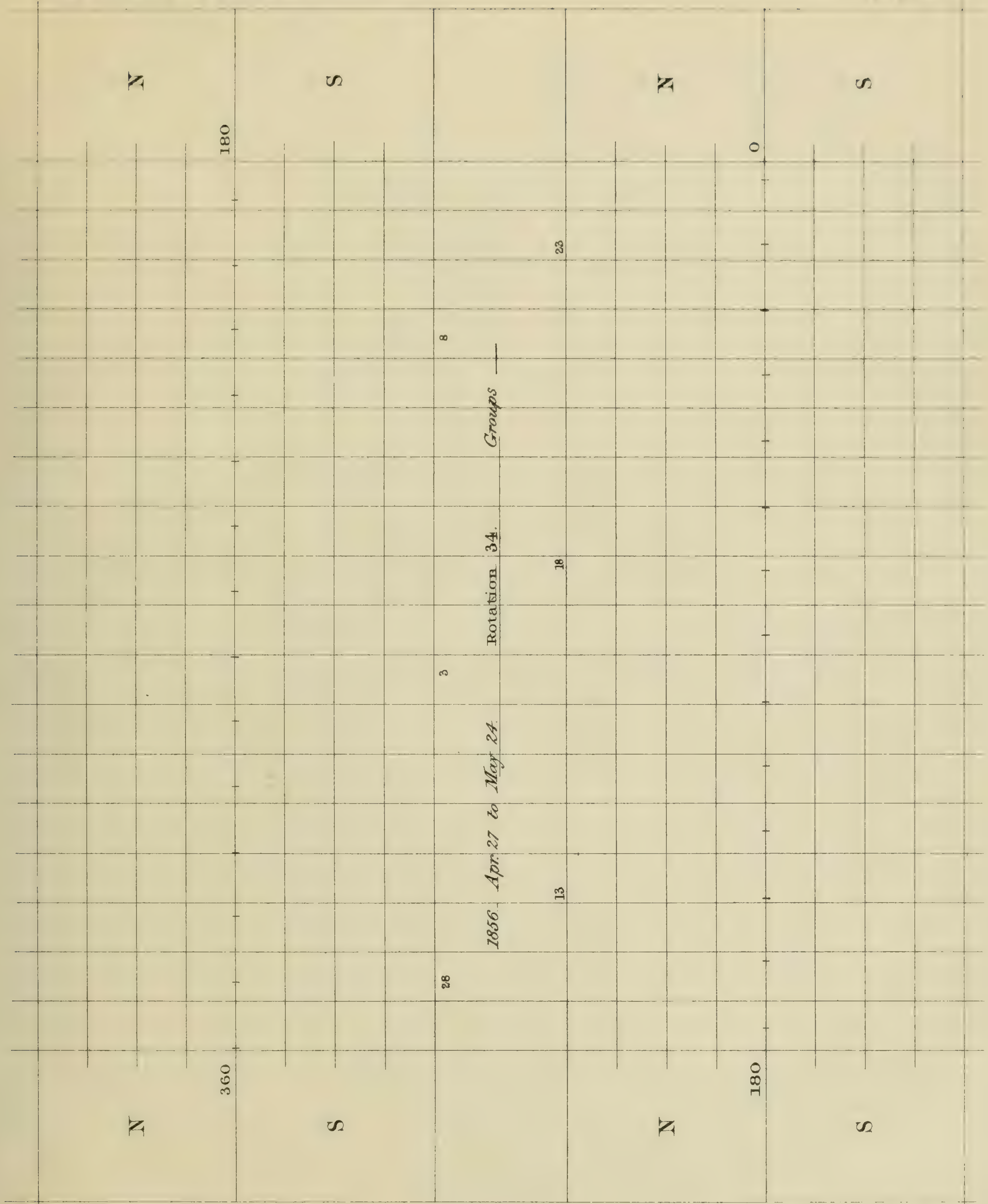


R. C. C. Del.

Fredk Dangerfield. Lith.

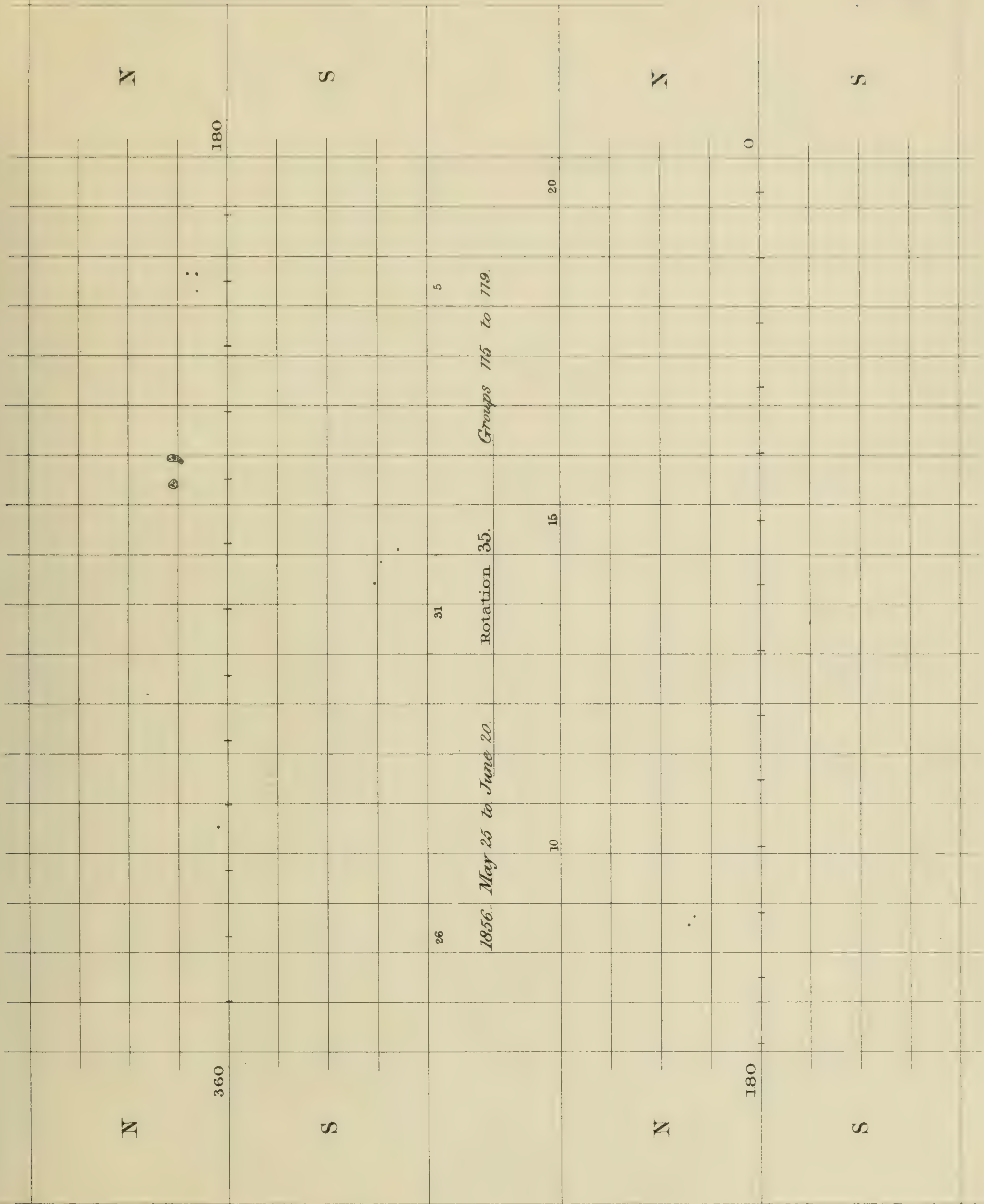


R. C. C. Del. Fredk. Lith.



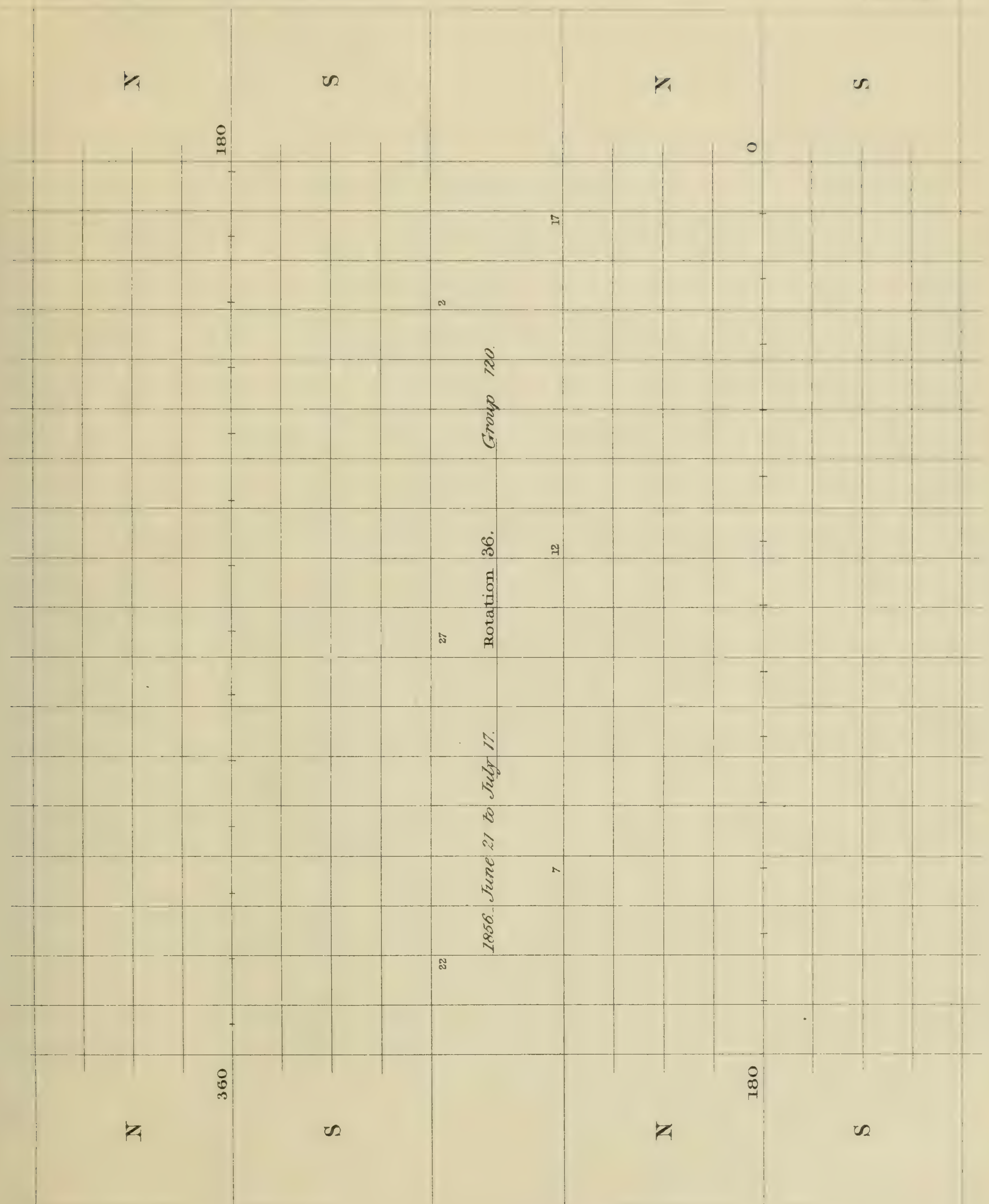
R. C. C. Del.

Fredk. Dangerfield. Lith.



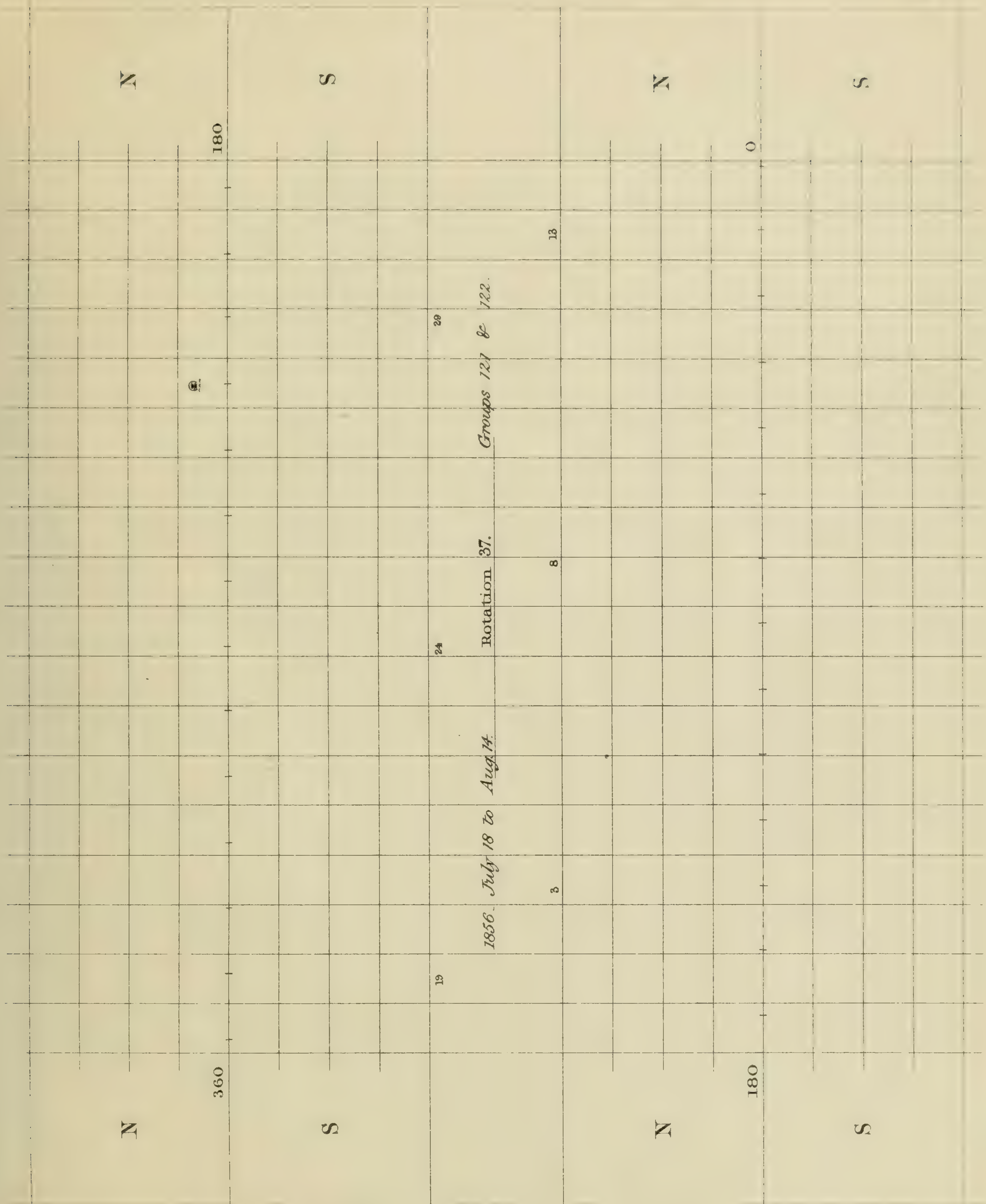
R. C. C. Del.

Fredk Bangerfield Lith.

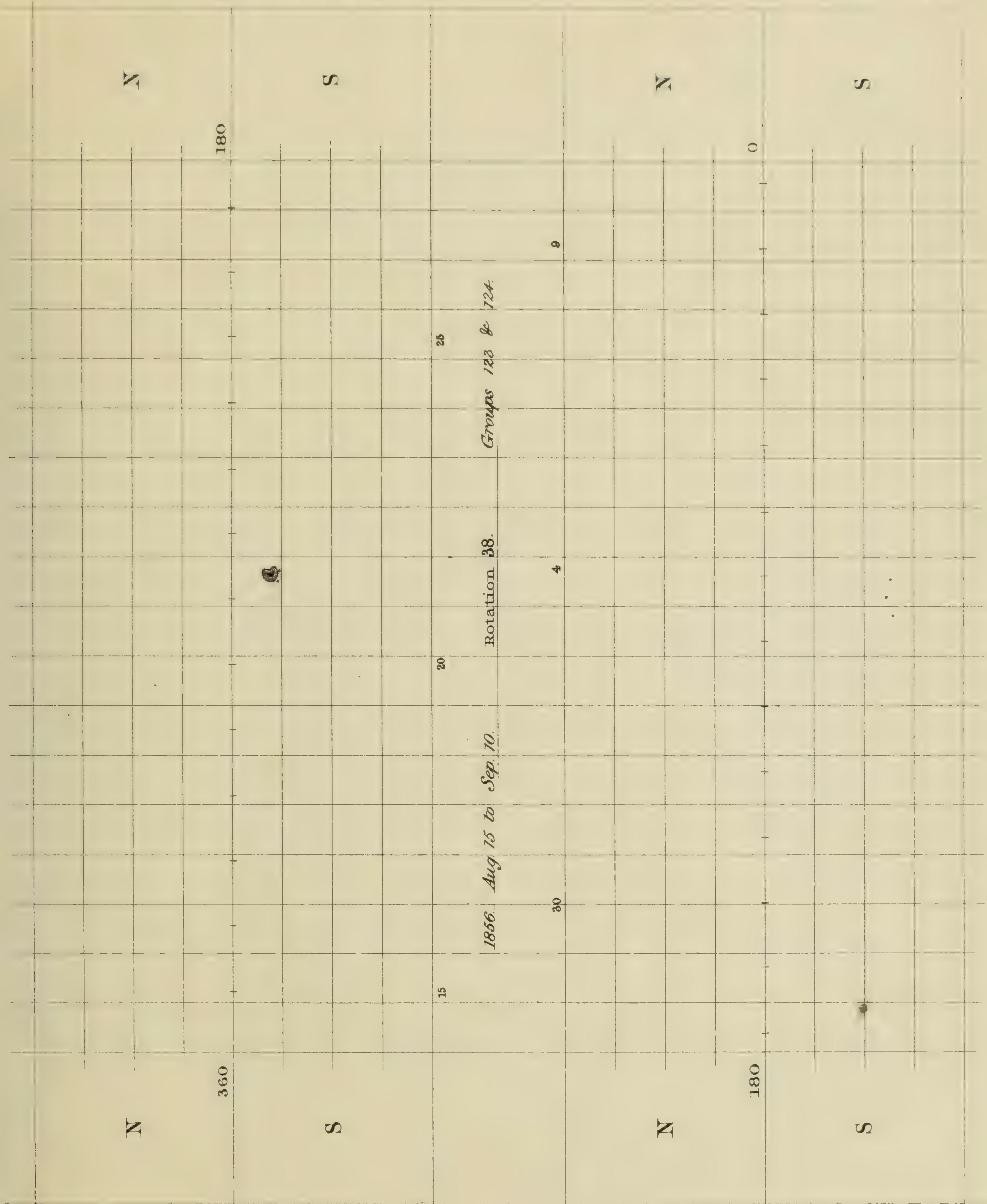


R. C. C. Del.

Fredk. Dangerfield. Lith.

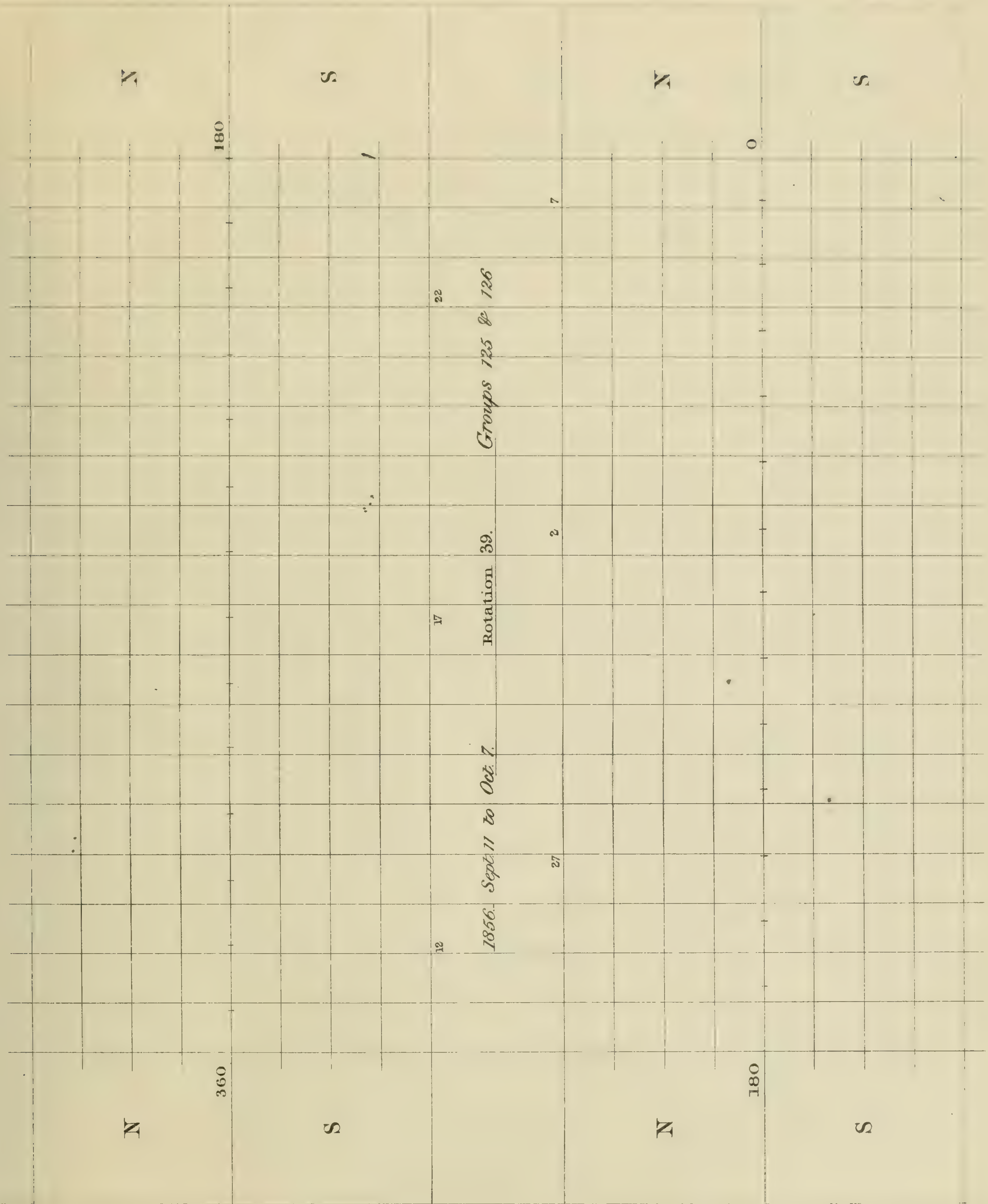

1856. July 18 to Aug 14. Rotation 37. Groups 121 & 122.
N
S
N
S
180
0
360
180
13
8
3
29
24
19

R C C Del.

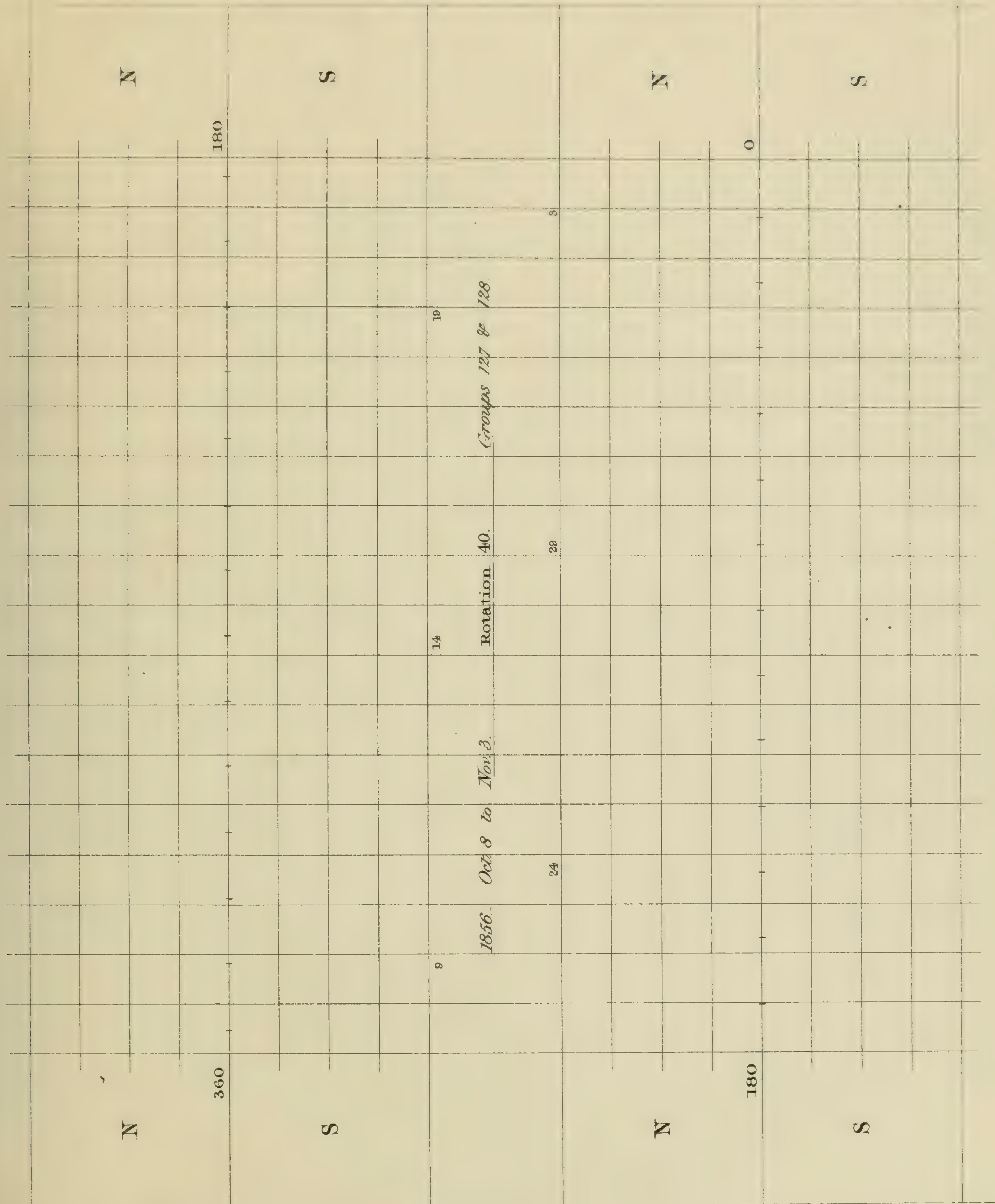


R. C. C. Del.

Fredk Dangerfield Lith.

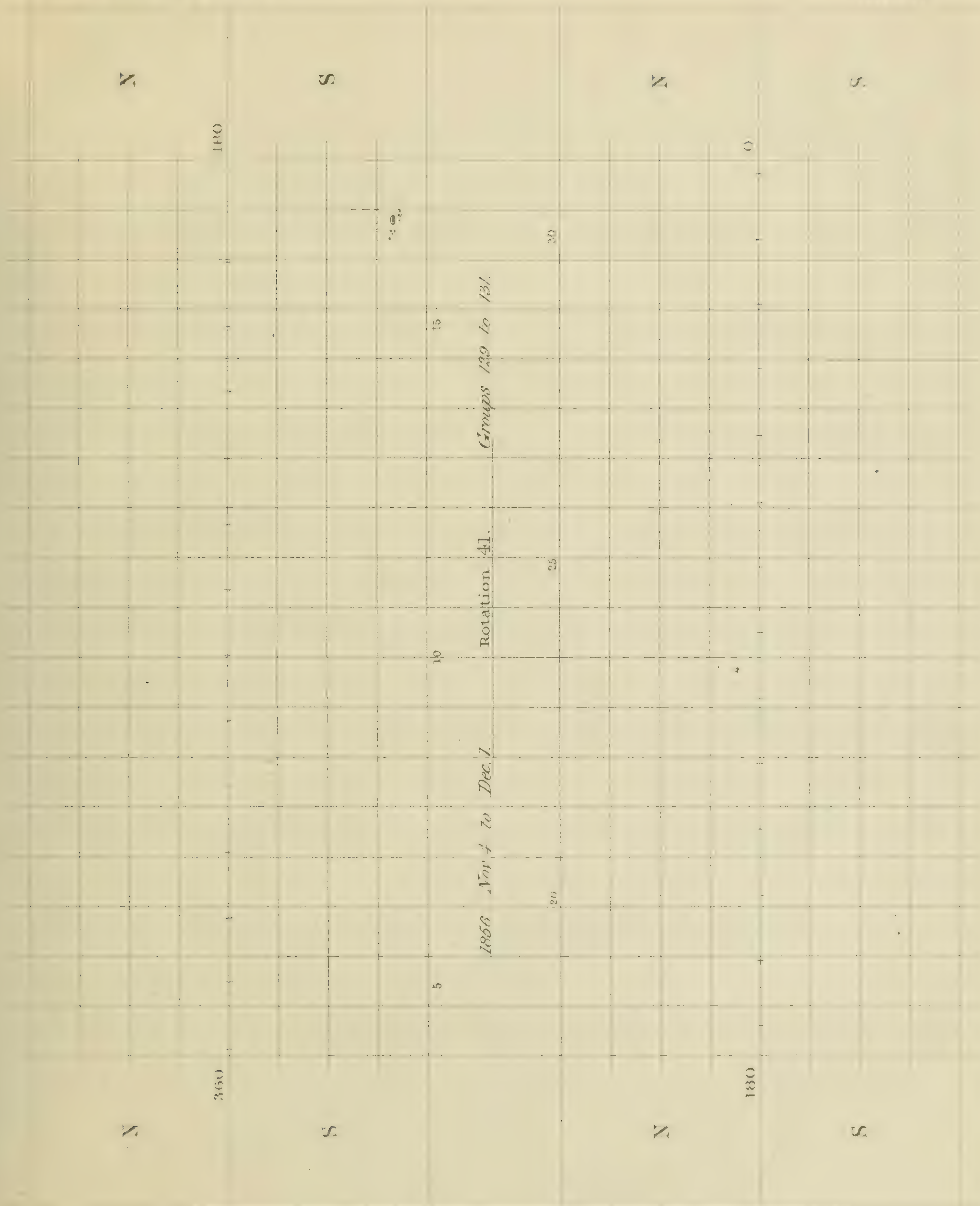

N
S
N
S
180
0
1856. Sept. 11 to Oct. 7.
Rotation 39.
Groups 125 & 126
22
17
12
7
2
27
360
180
N
S
N
S

R. C. C. Del.

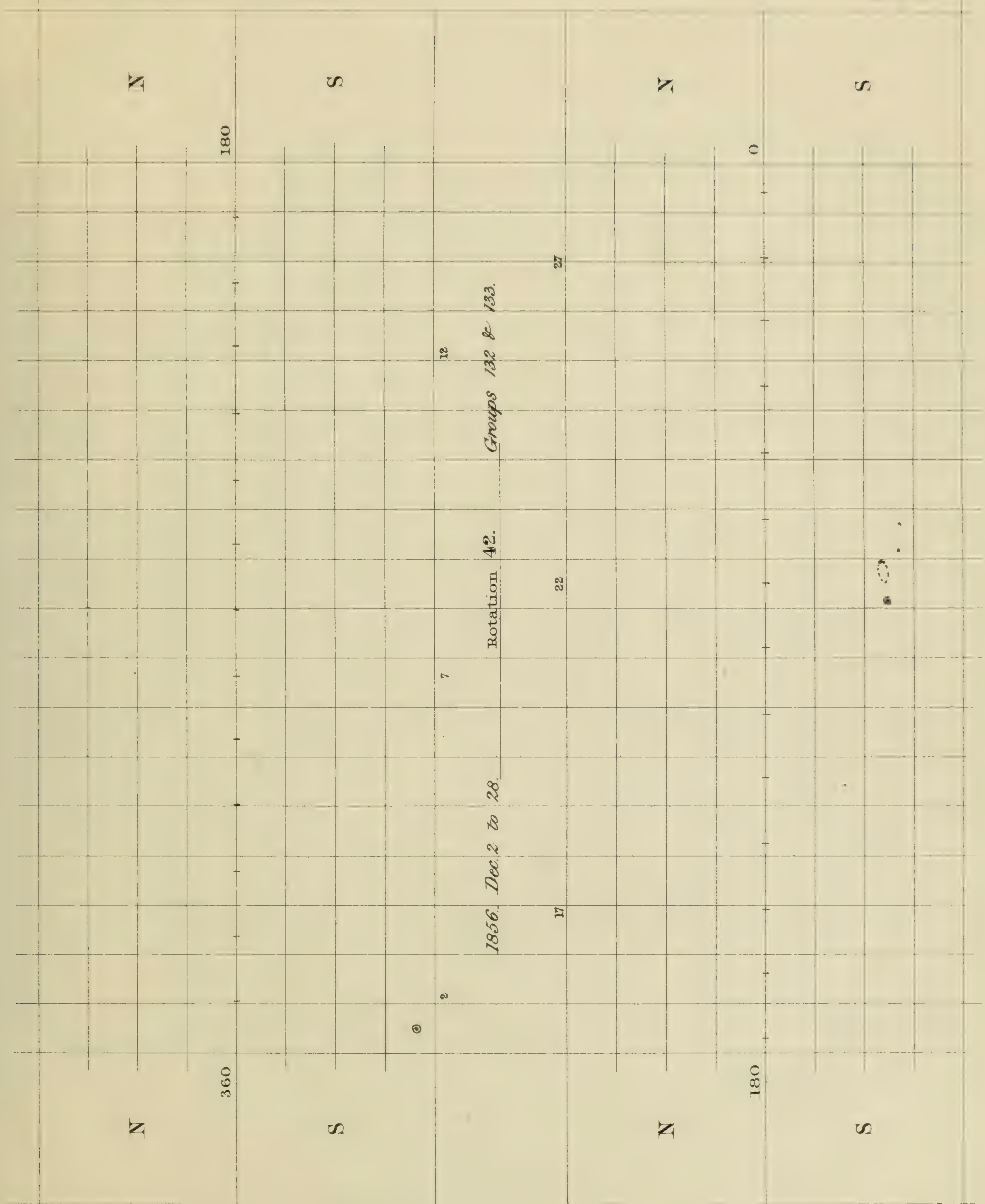


R C C Del.

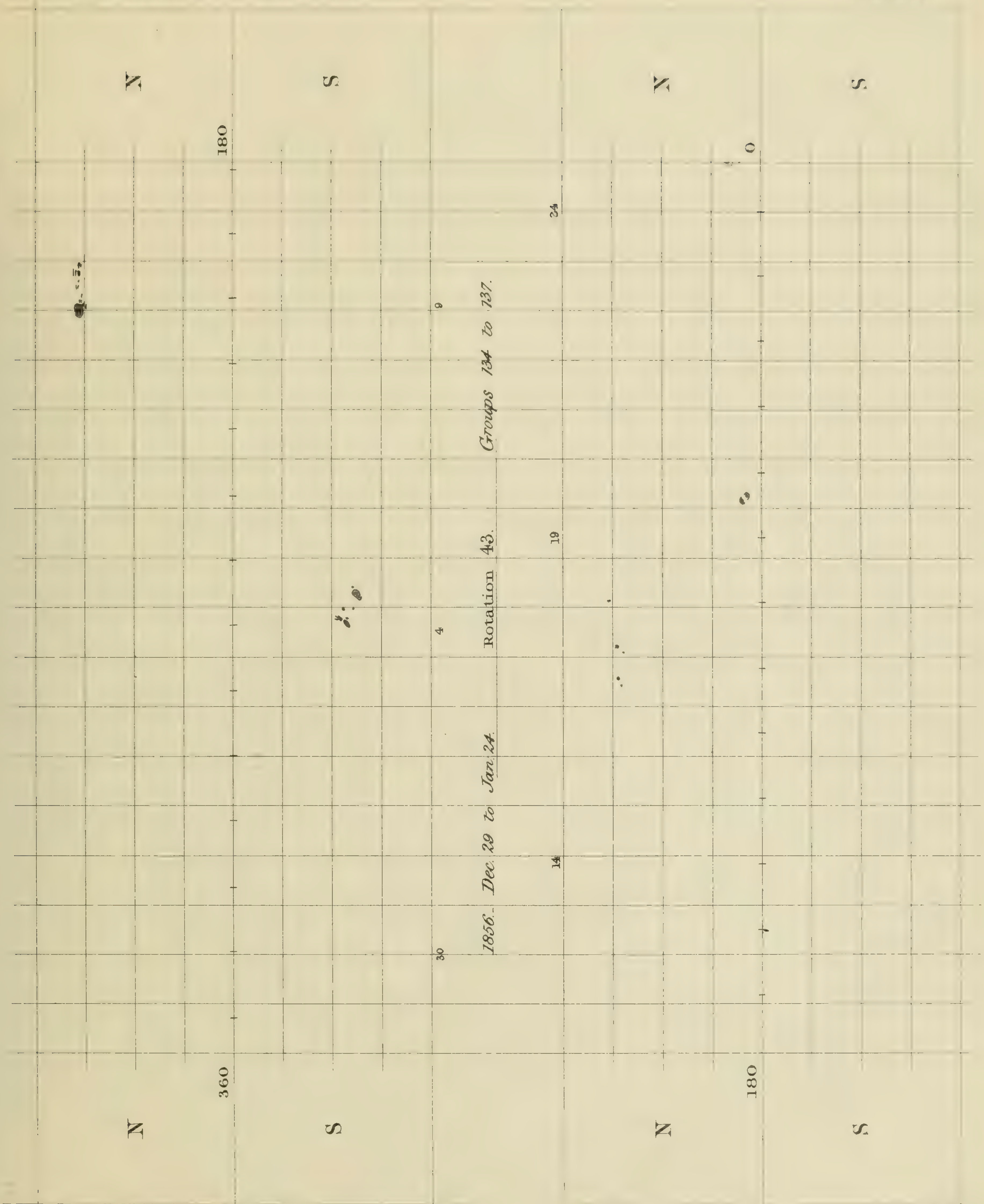
Fredk Dangerfield. Lith



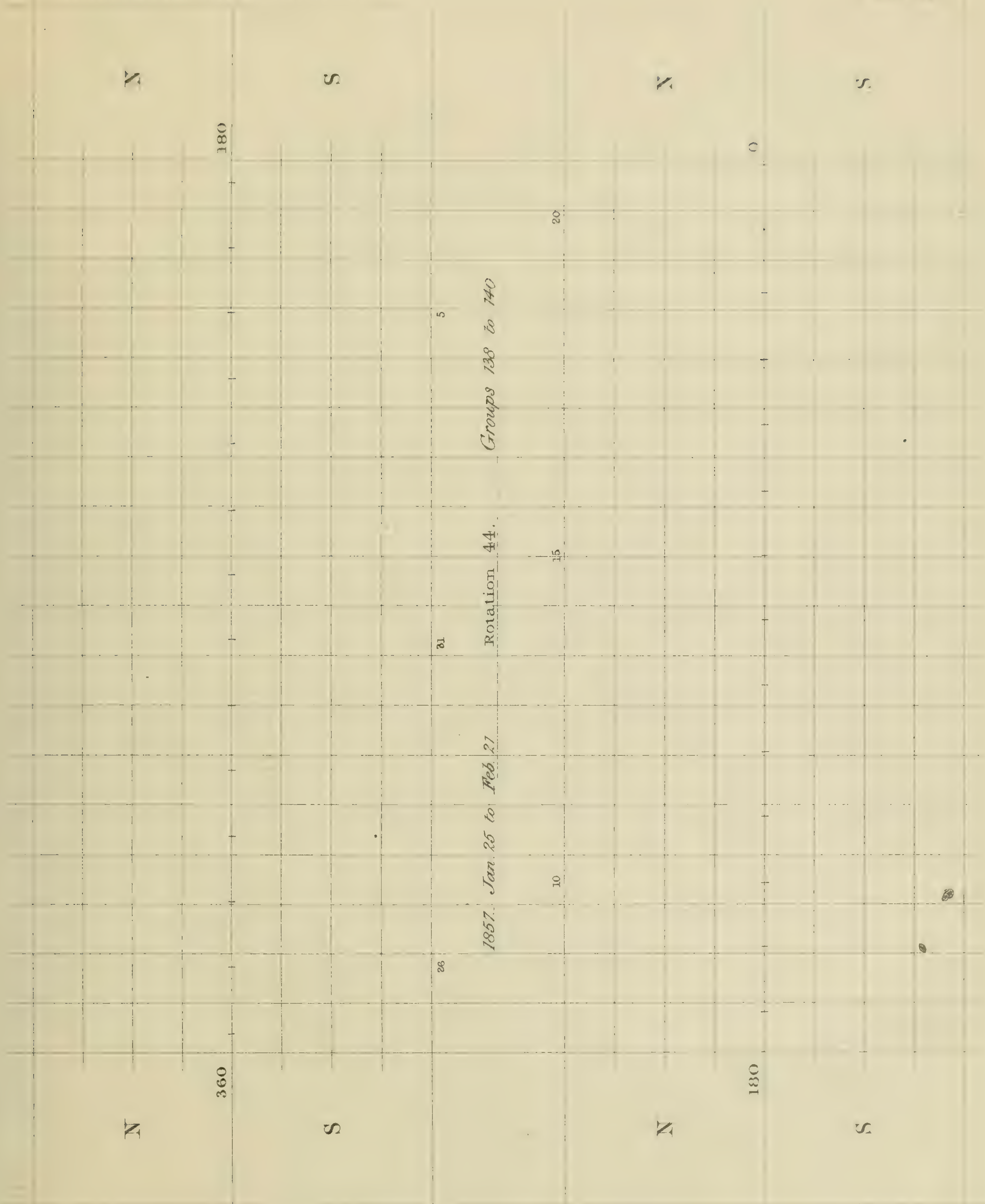
Fredk Dangerfield. Lith.



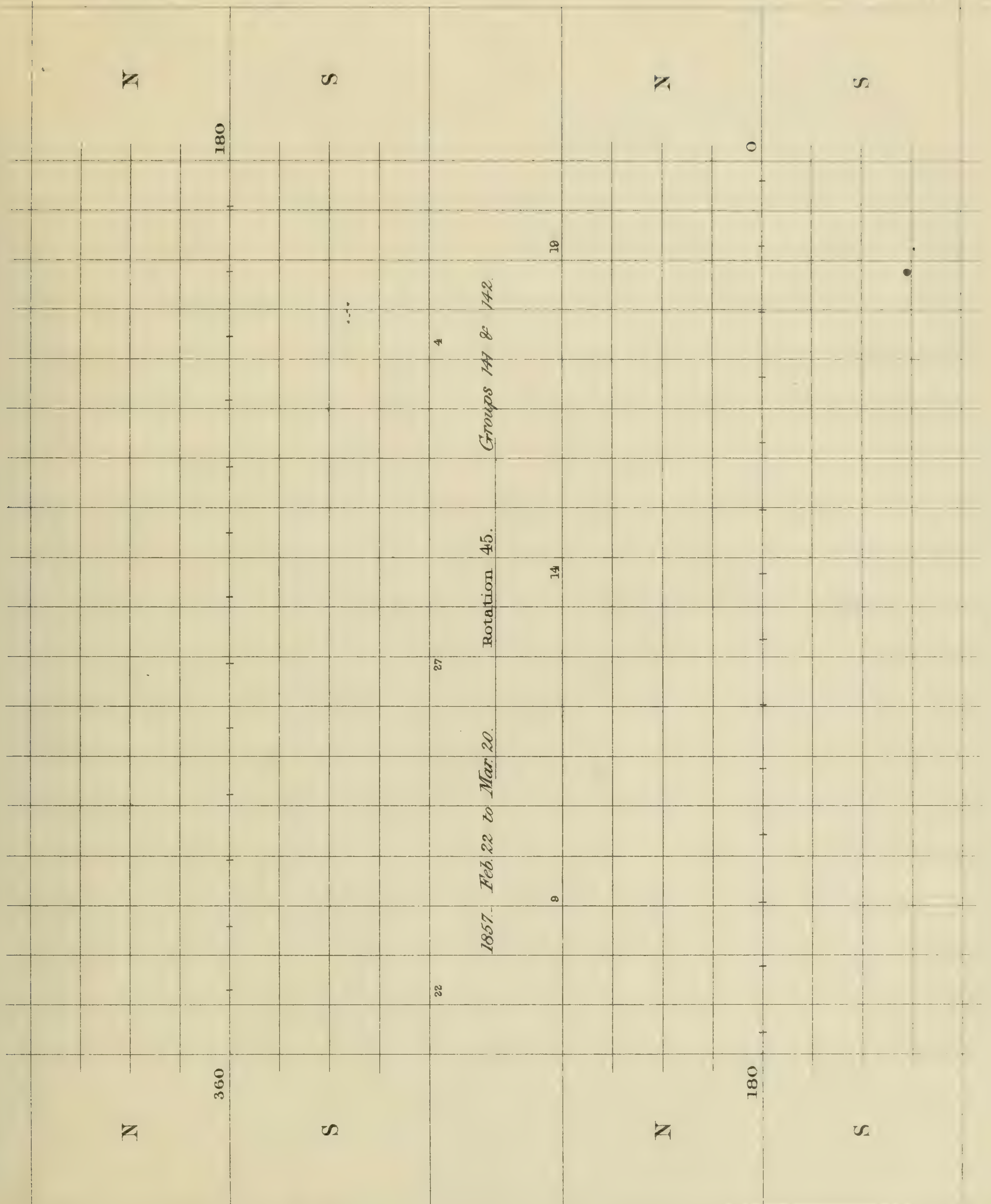
R C C Del. Fred^k. Dangerfield Lith^r.


N
S
N
S
180
0
24
9
19
4
14
30
360
180
1856. Dec. 29 to Jan. 24. Rotation 43. Groups 134 to 137.
N
S
N
S

R C C Del.

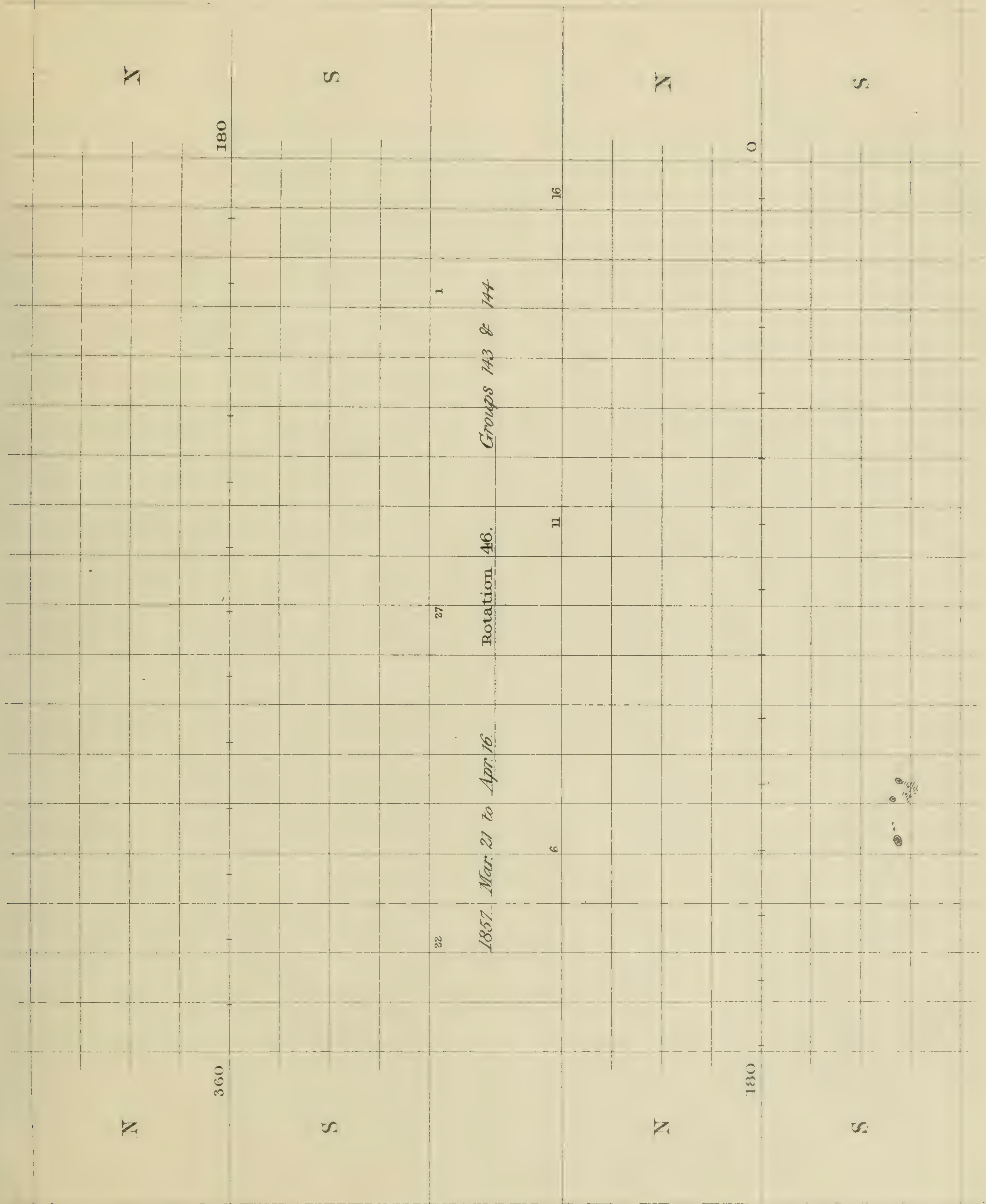

N
S
N
S
180
0
360
180
1857. Jan. 25 to Feb. 21
Rotation 44.
Groups 138 to 140
5
10
15
20
21
26

R. C. C. Del.



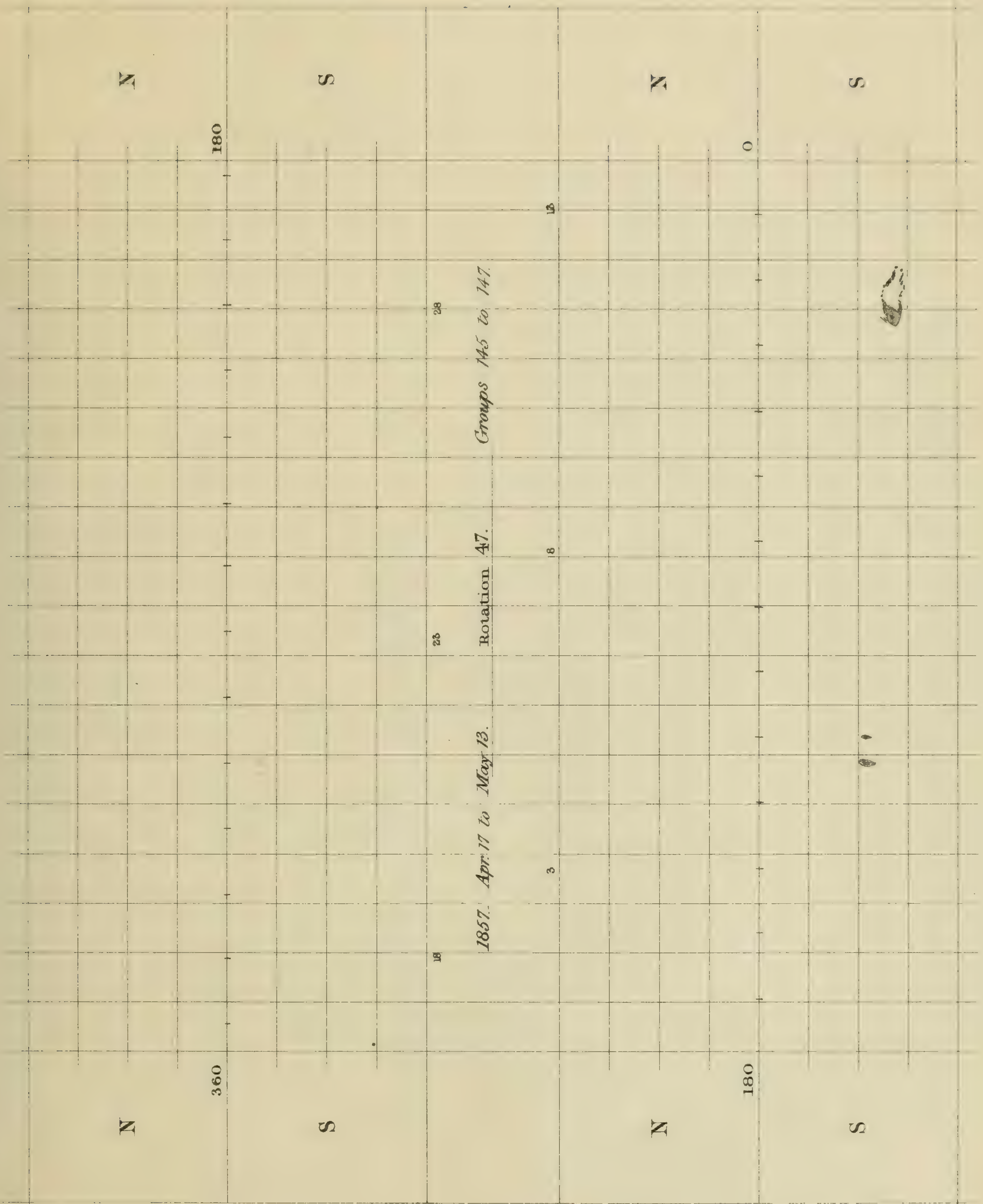
R. C. C. Del.

Fredᵏ Dangerfield. Lith.



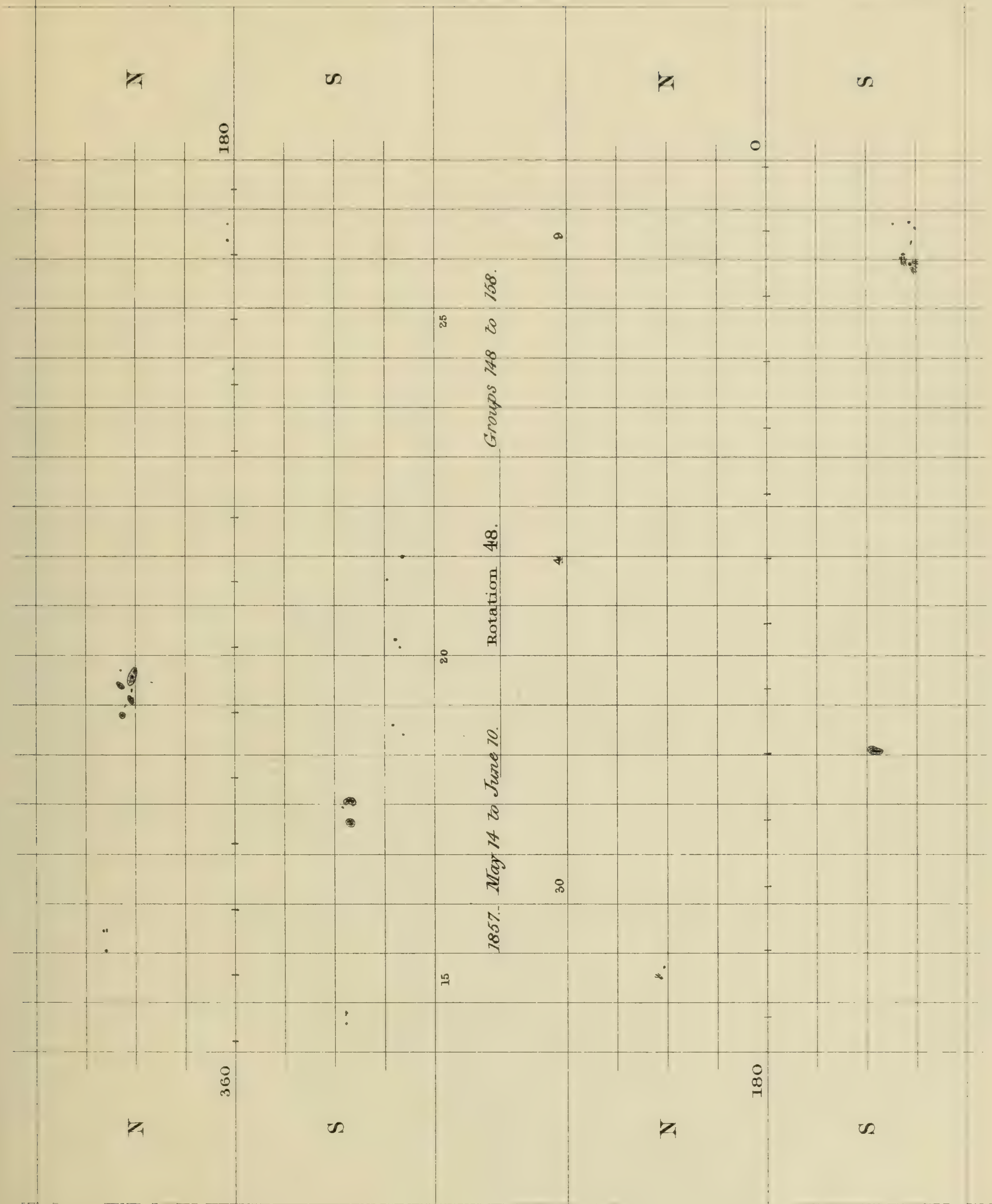
R. C. C. Del.

Fredk Dangerfield Lith



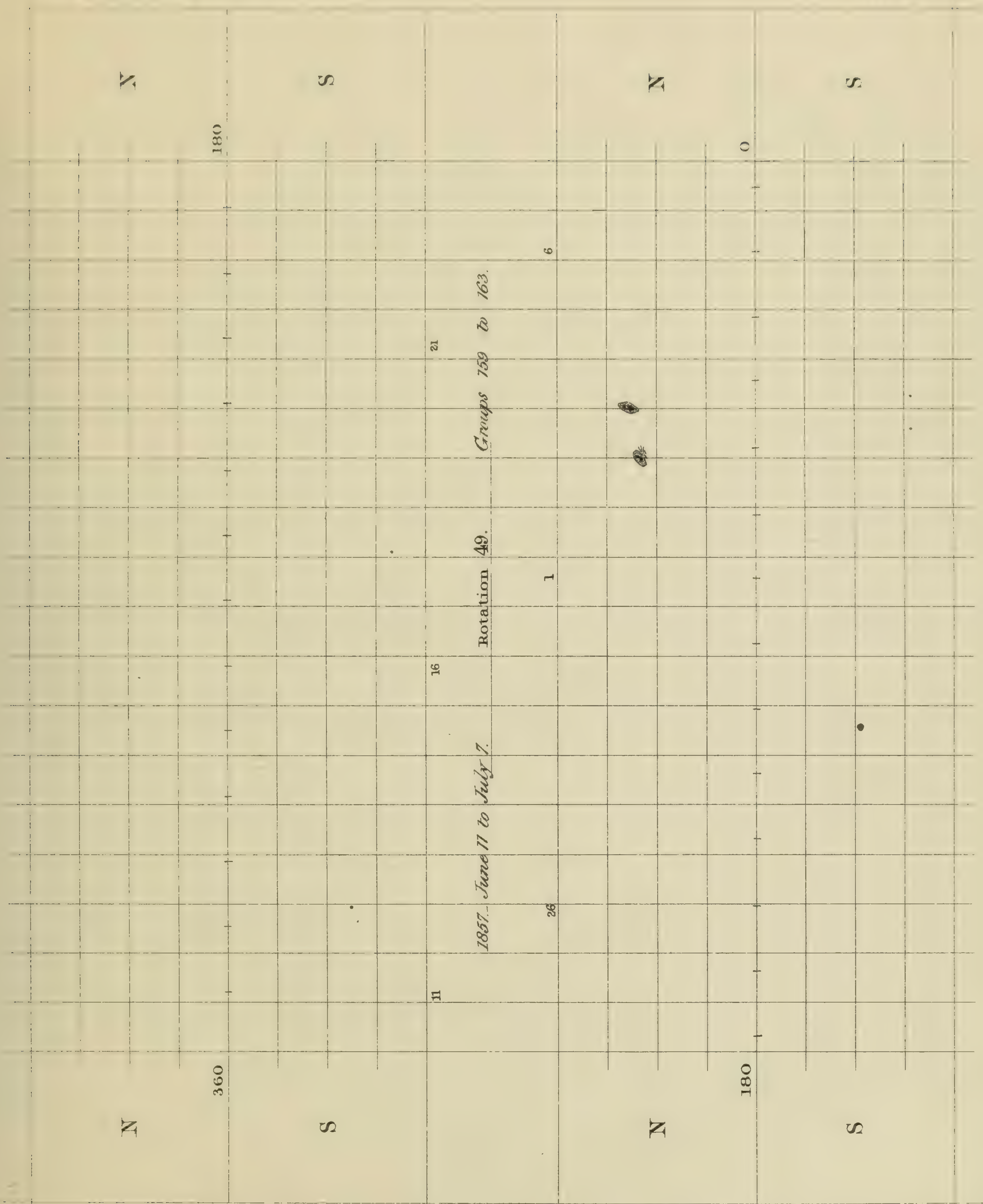
R. C. C. Del

Fredk Dangerfield. Lith



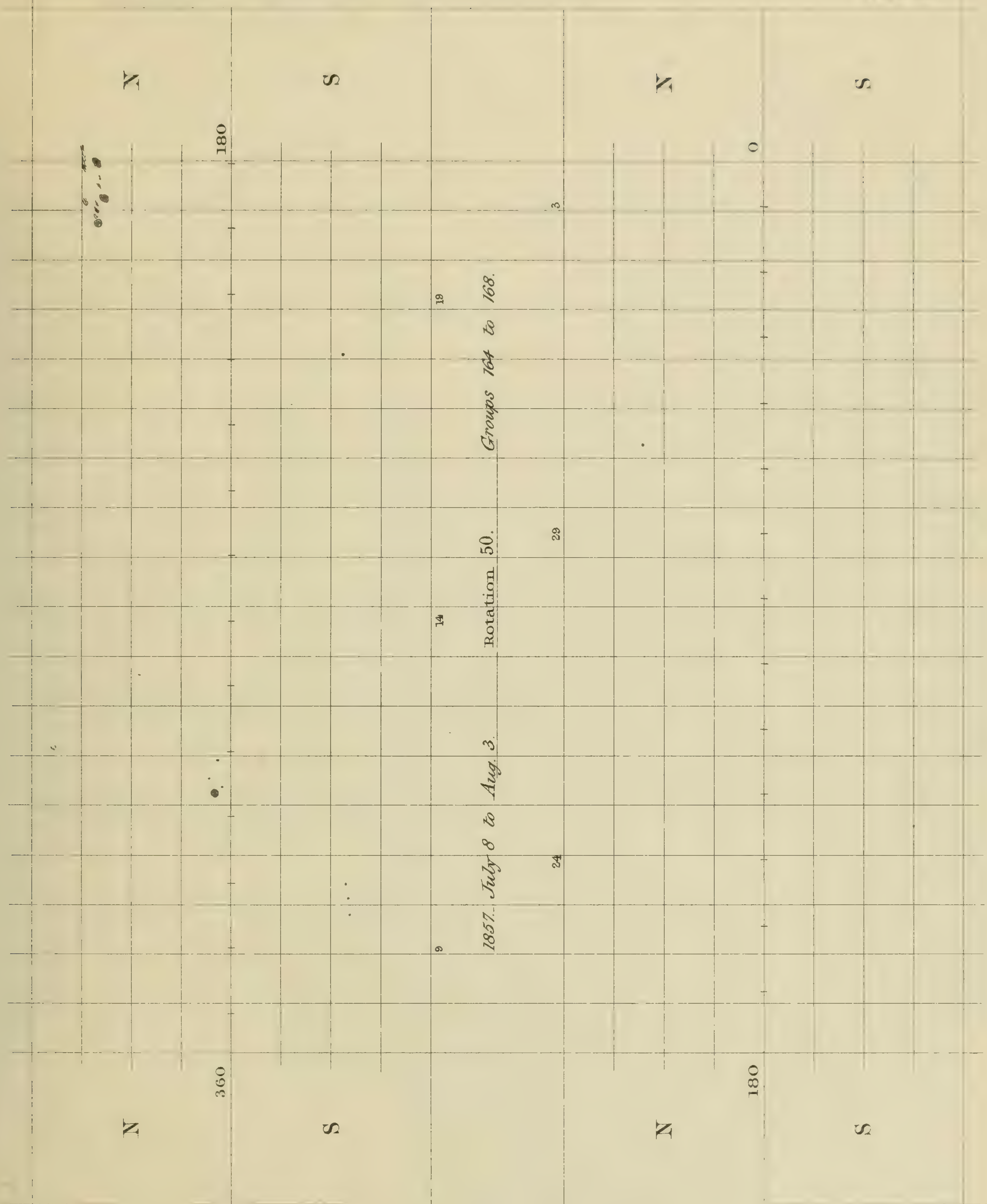
R. C. C. Del.

Fredk. Dangerfield. Lith.

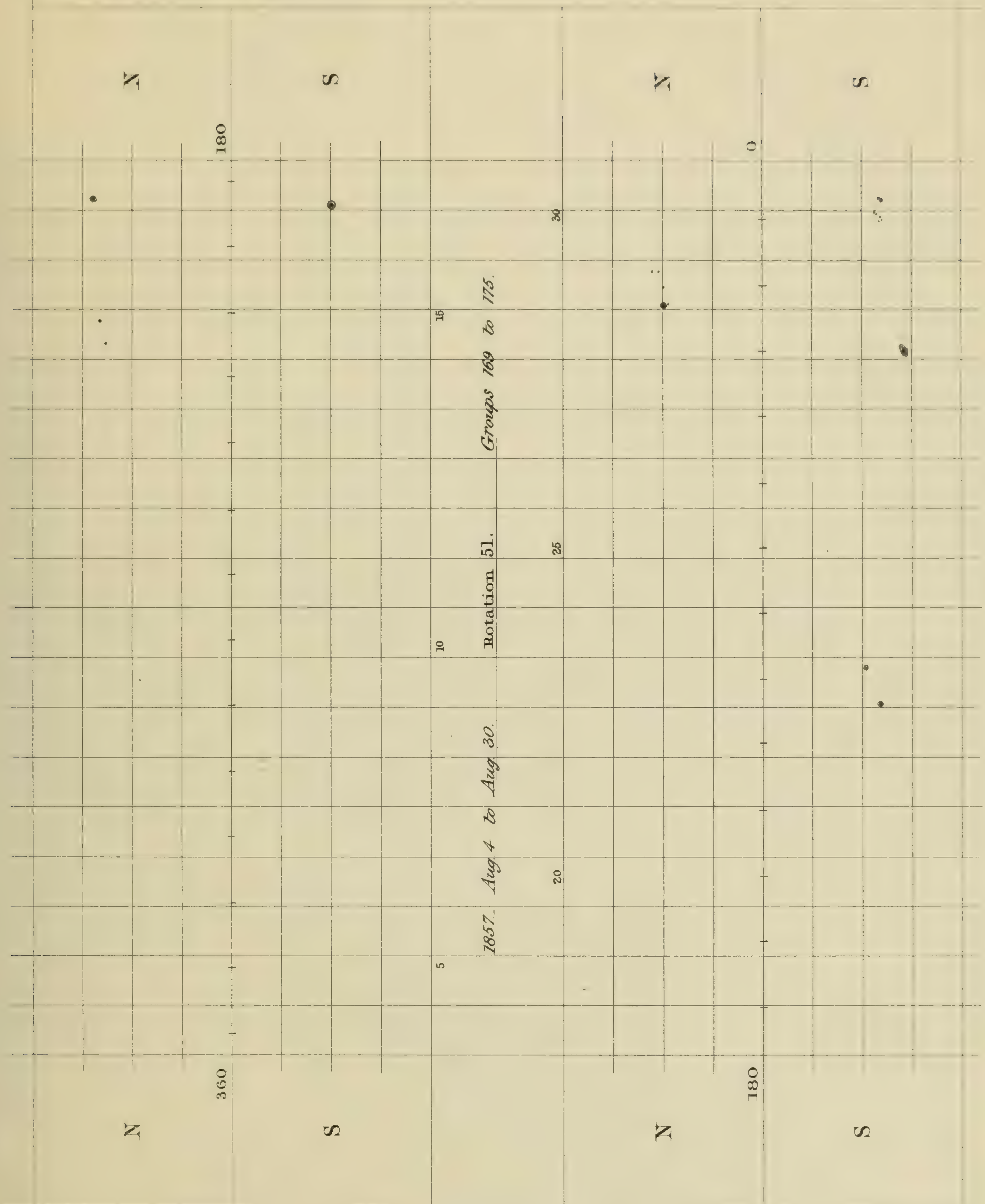


R. C. C. Del.

Fredk Dangerfield. Lith.

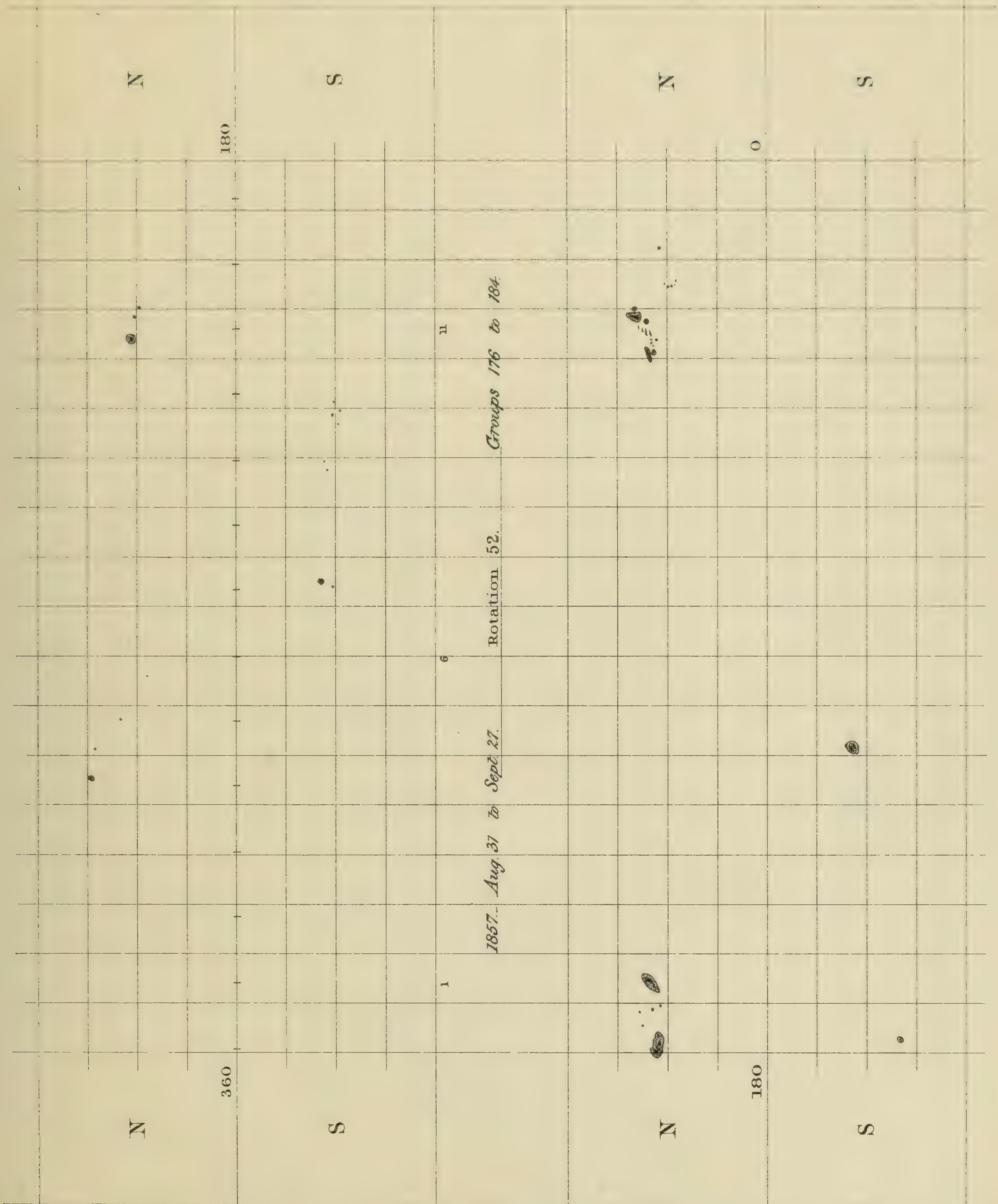

N
S
N
S
180
0
1857. July 8 to Aug. 3.
Rotation 50.
Groups 164 to 168.
3
19
29
14
24
9
360
180
N
S
N
S

R. C. C. Del.



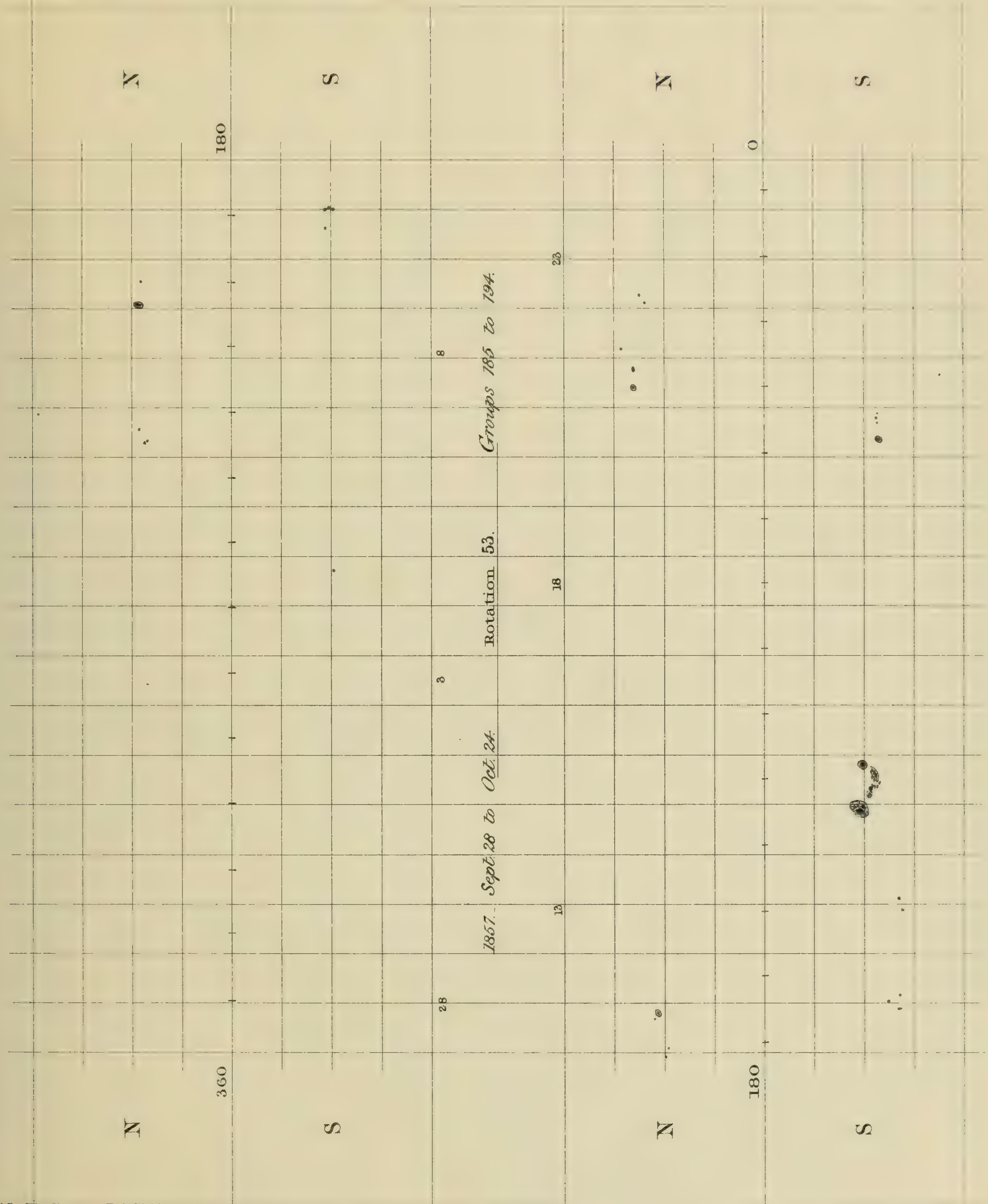
R. C. C. Del.

Fredk. Dangerfield. Lith.



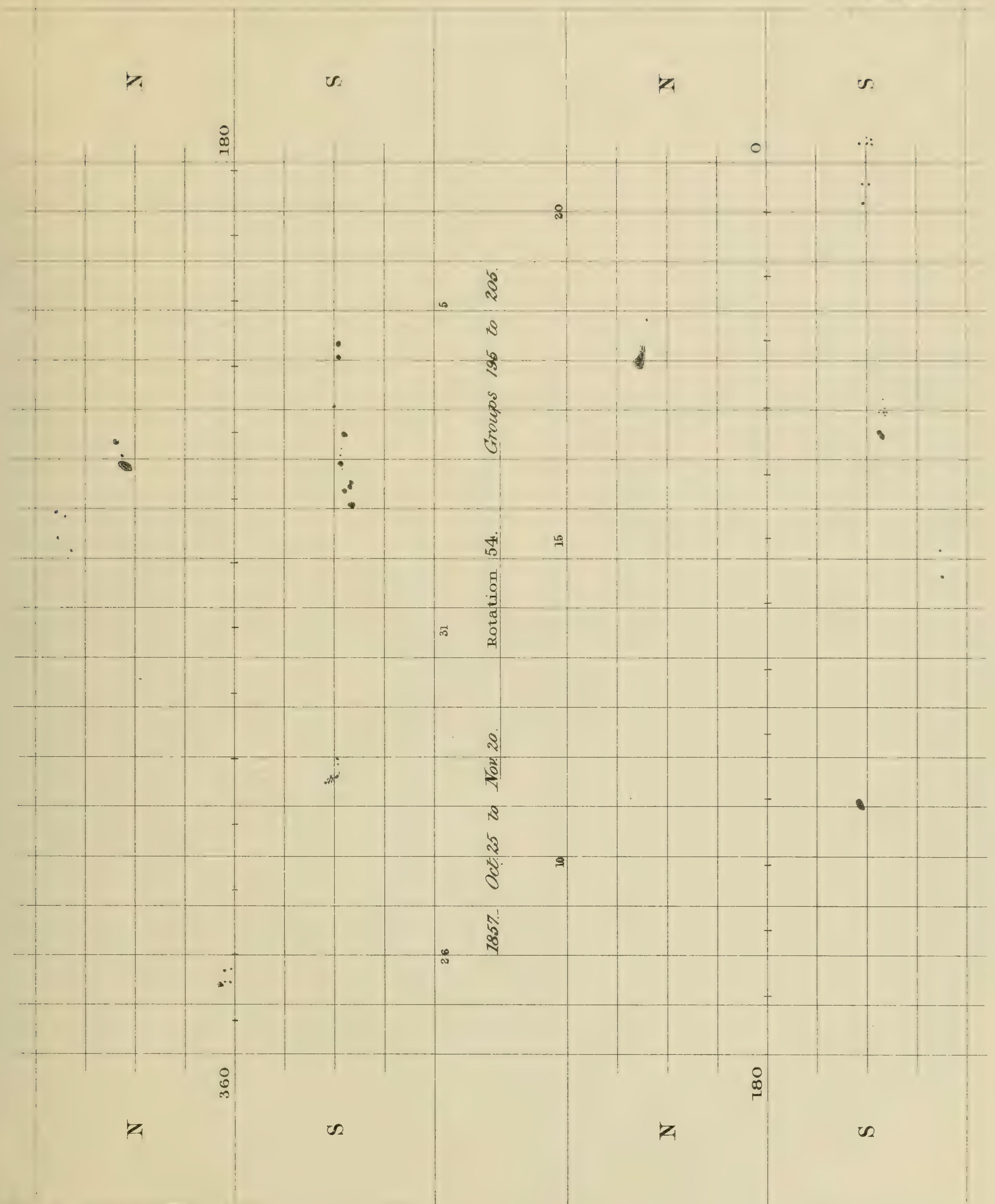
R. C. C. Del.

Fred^k Dangerfield. Lith.



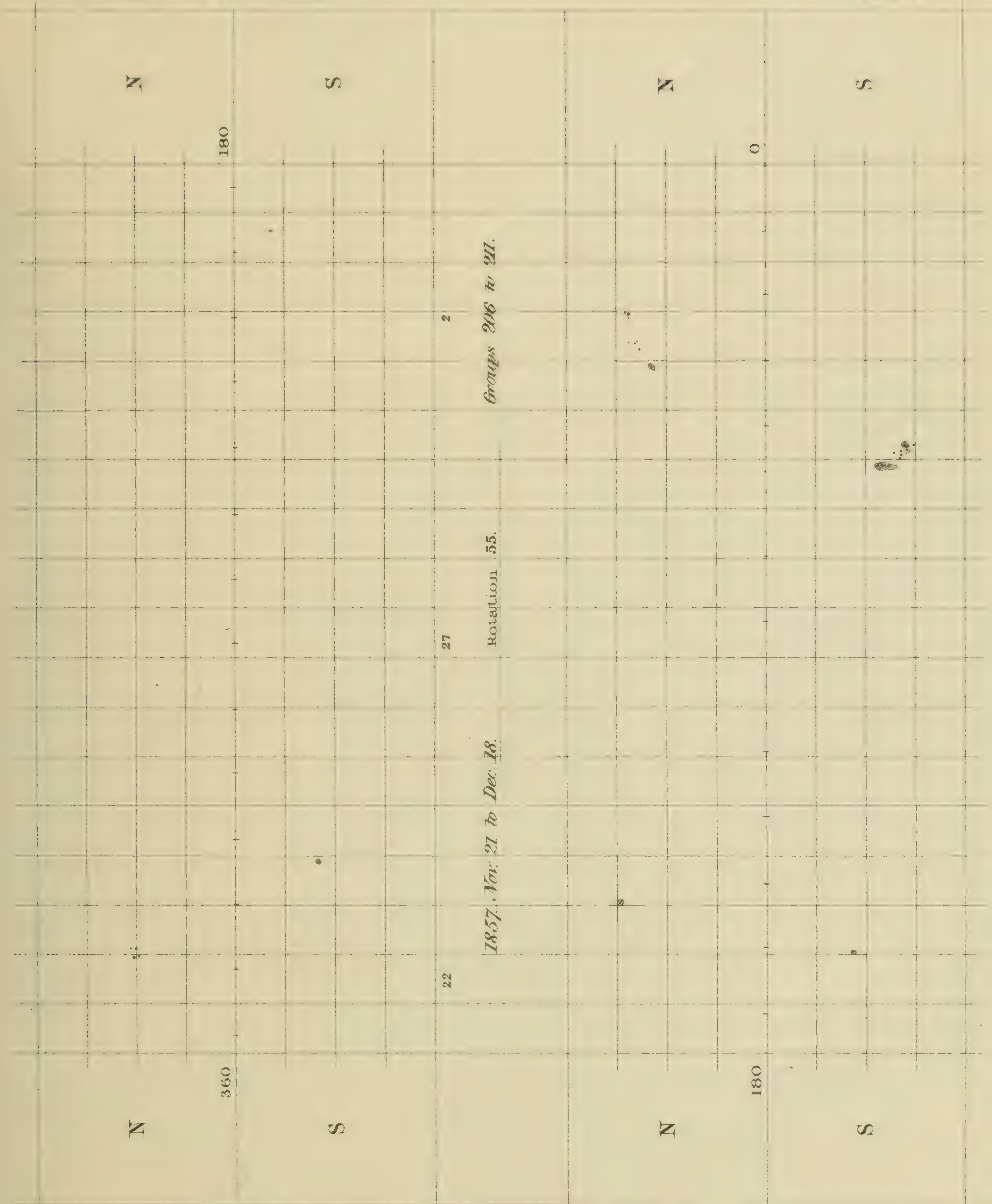
R. C. C. Del.

Fredk Dangerfield. Lith.



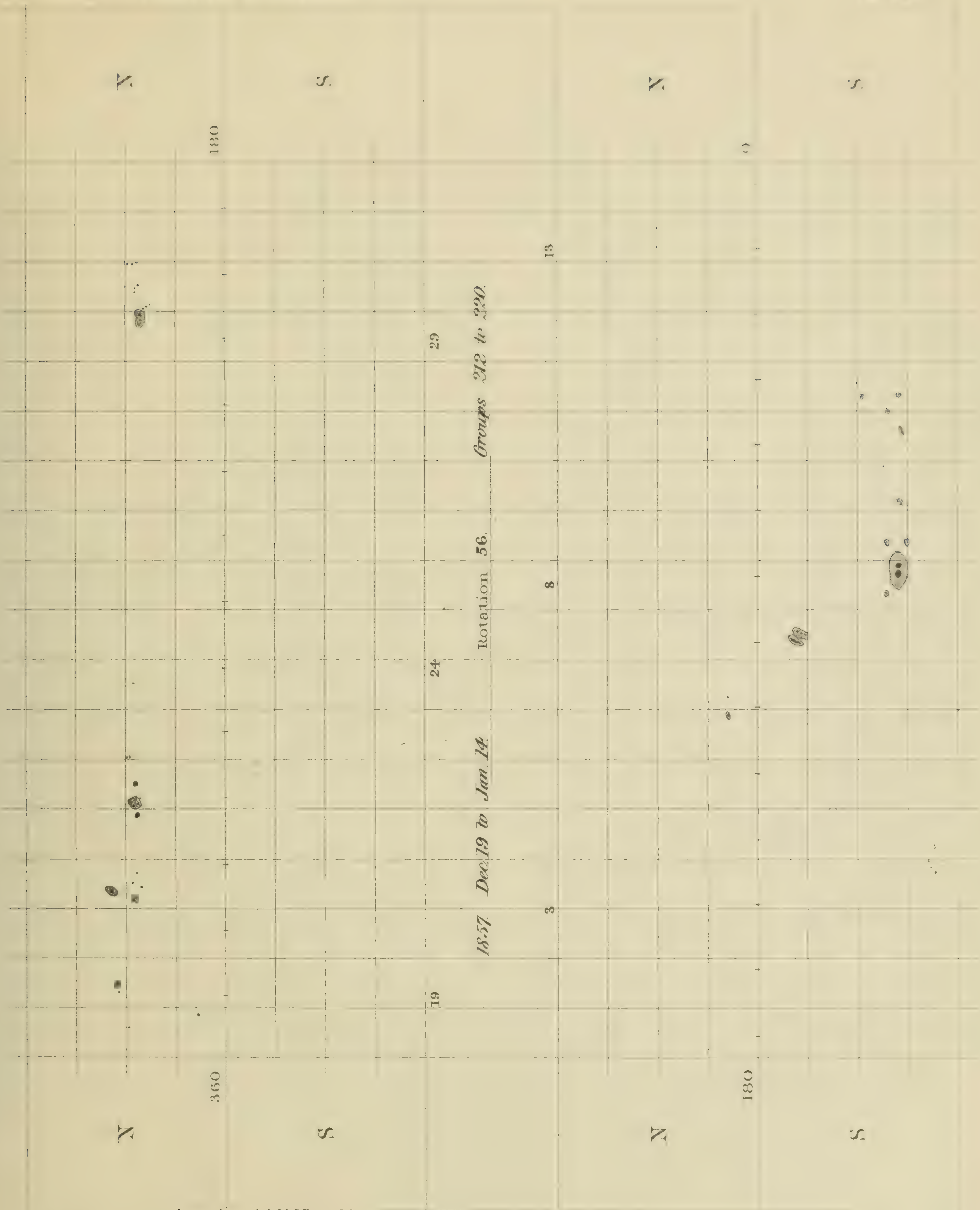
R. C. C. Del.

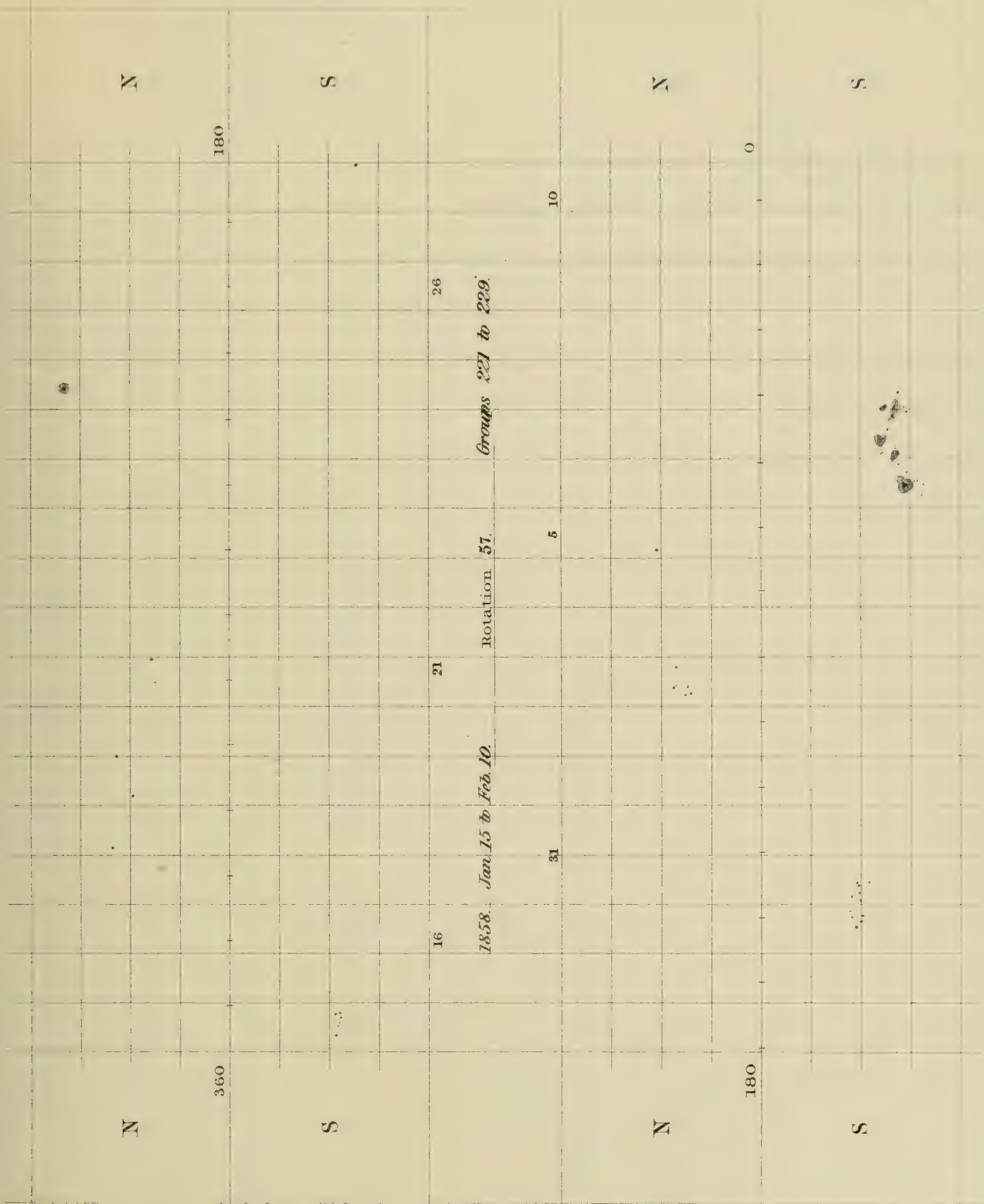
Fredk. Dangerfield. Lith.



R. C. C. Del.

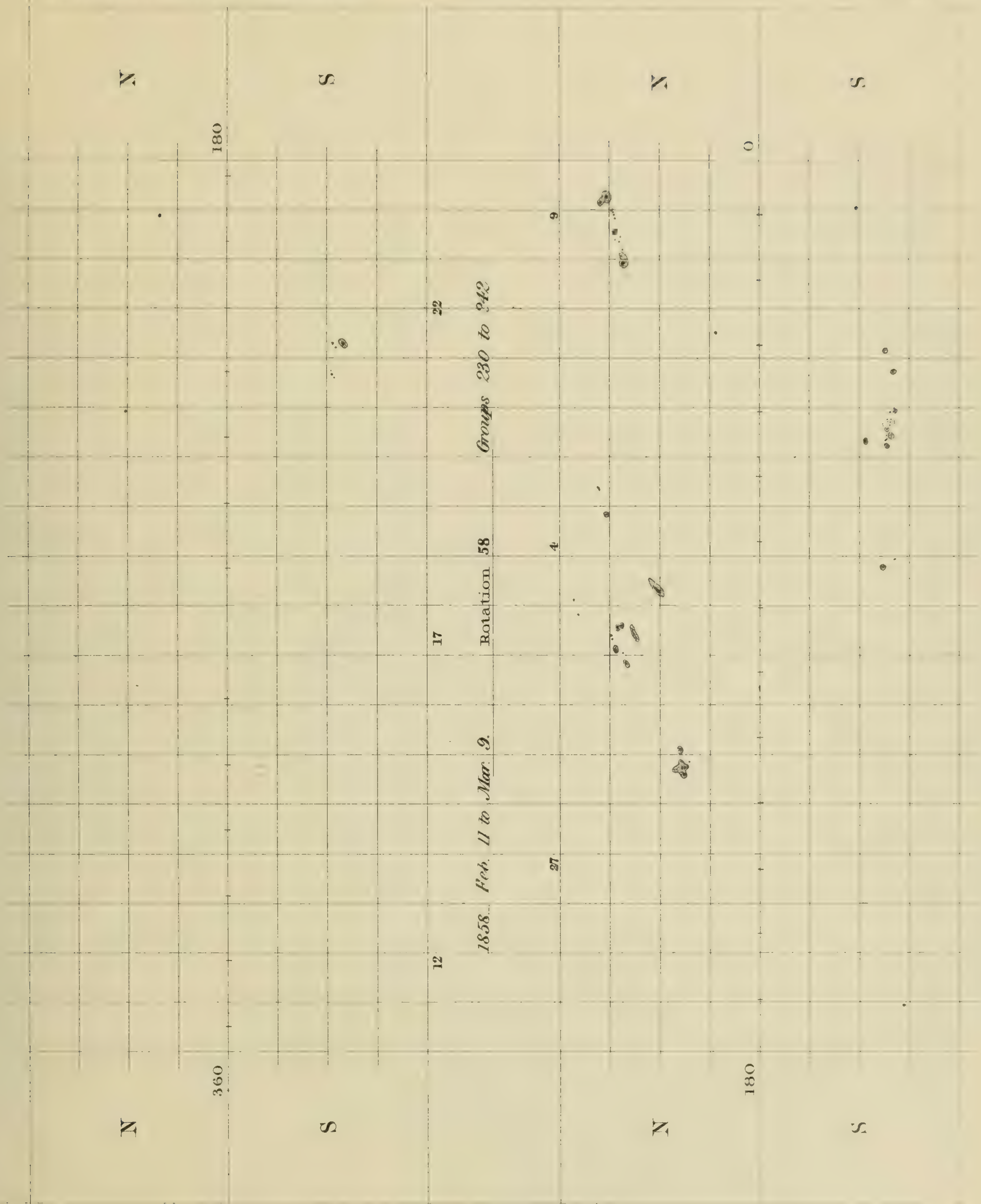
Fredk Bangerfield, Lith.


1857 Dec. 19 to Jan. 14 Rotation 56. Groups 212 to 220.
N
S
N
S
180
360
0
180
19
24
29
3
8
13

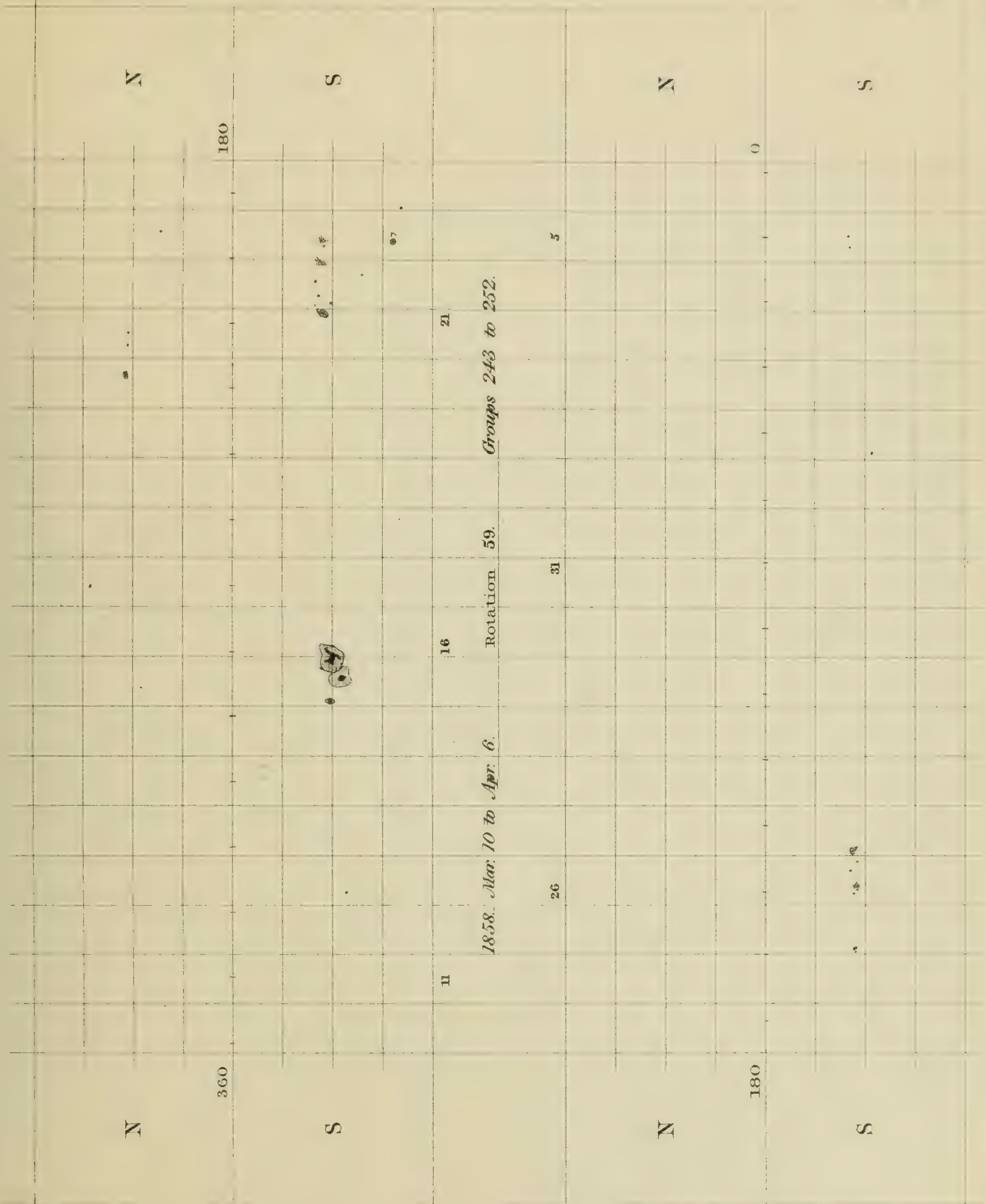


R C C Del.

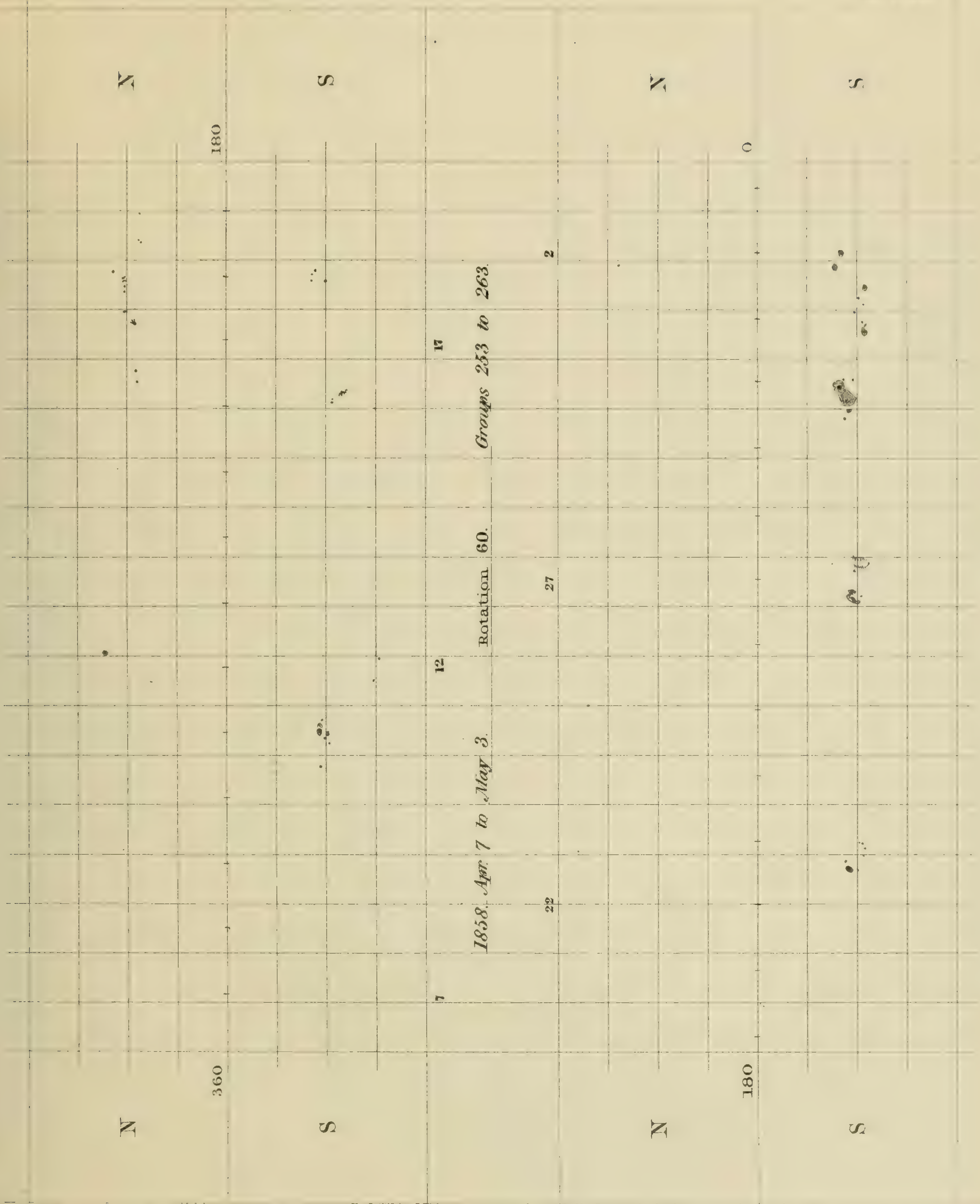
Fredk Dangerfield Lith.


N
S
N
S
180
0
1858. Feb. 11 to Mar. 9. Rotation 58 Groups 230 to 242
22
17
12
9
4
27
360
180
N
S
N
S

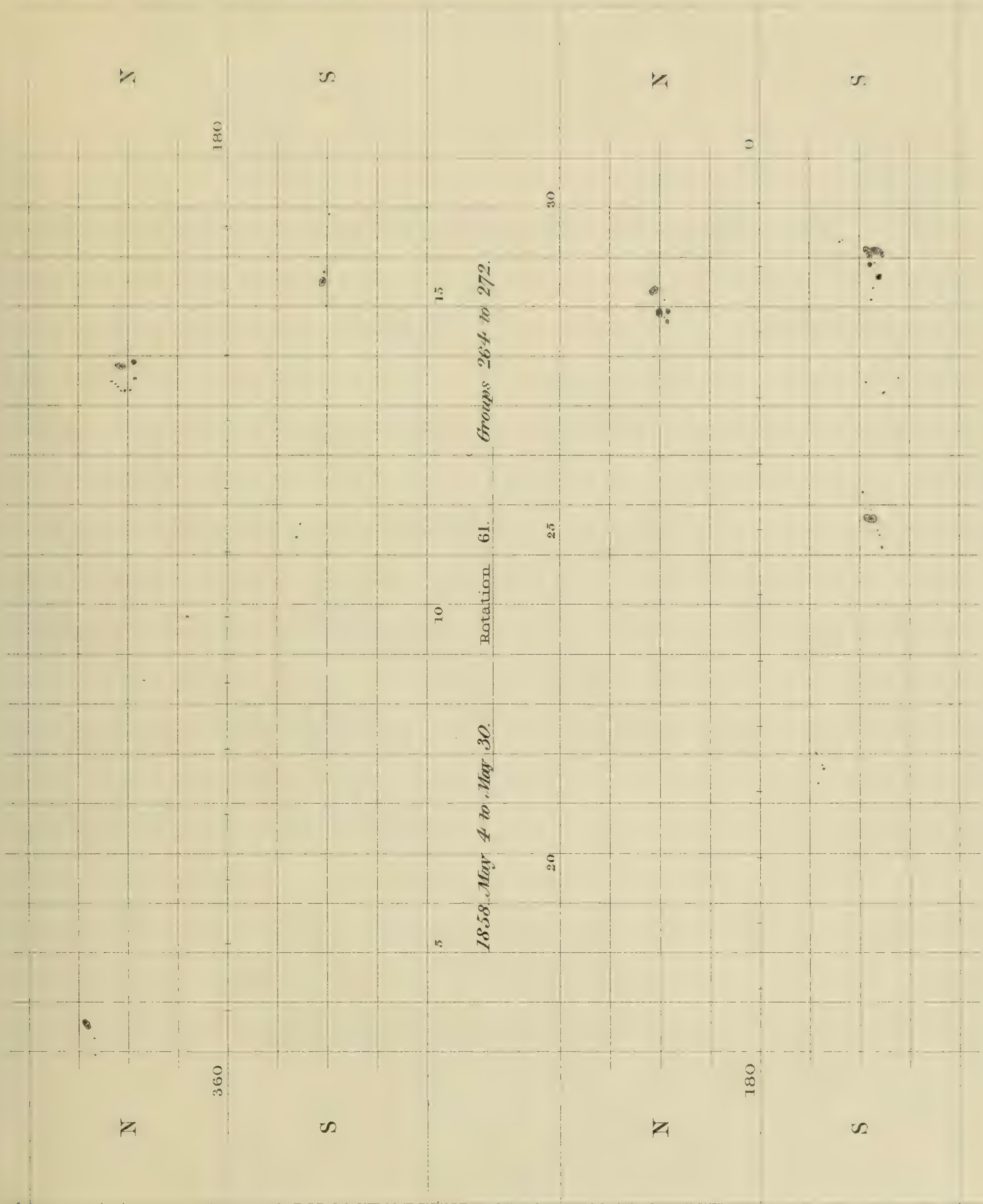
R C C Del



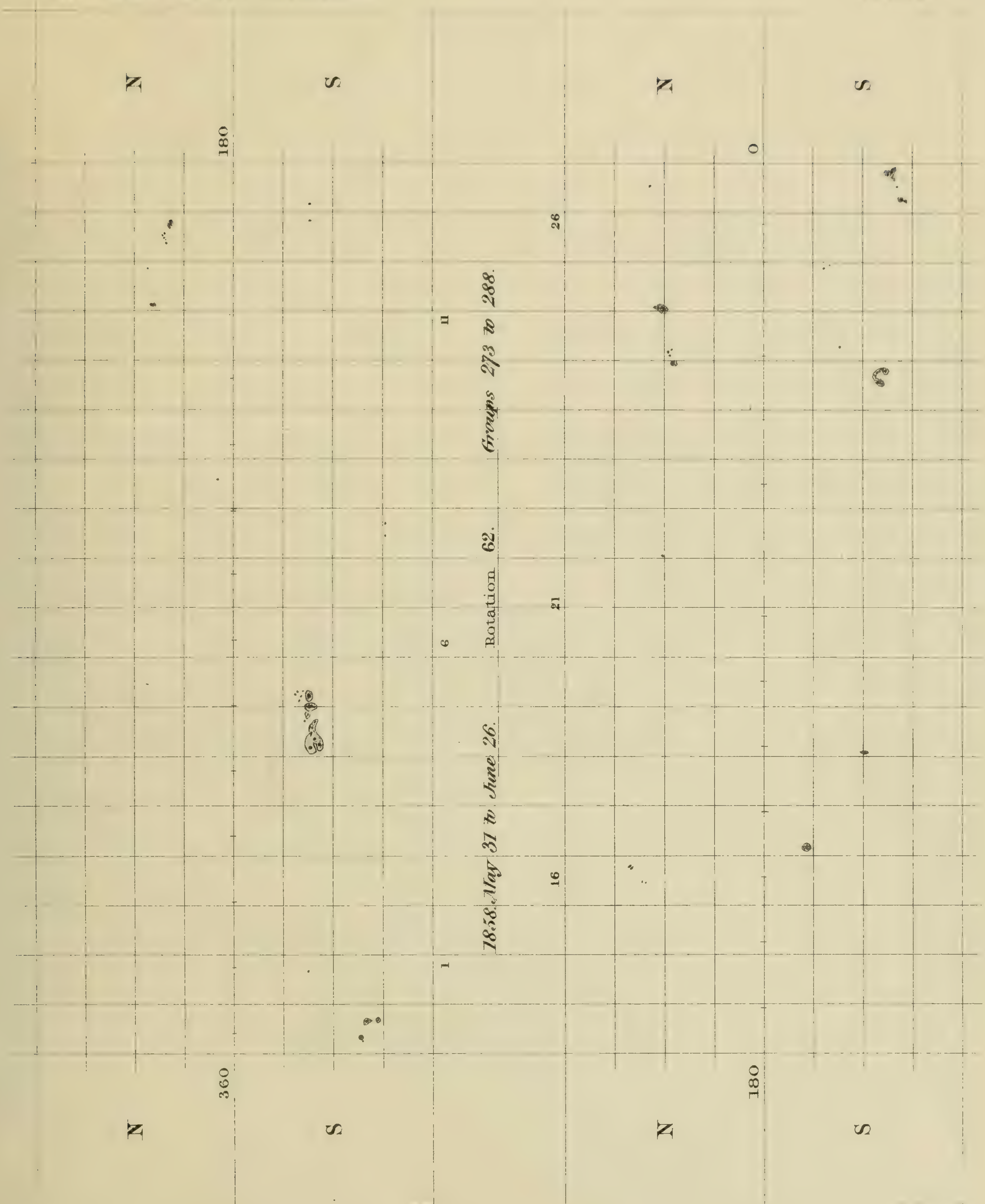
R. C. C. Del. Fredk. Bangerfield Lith.



R C C Del. Fredk Dangerfield Lith.

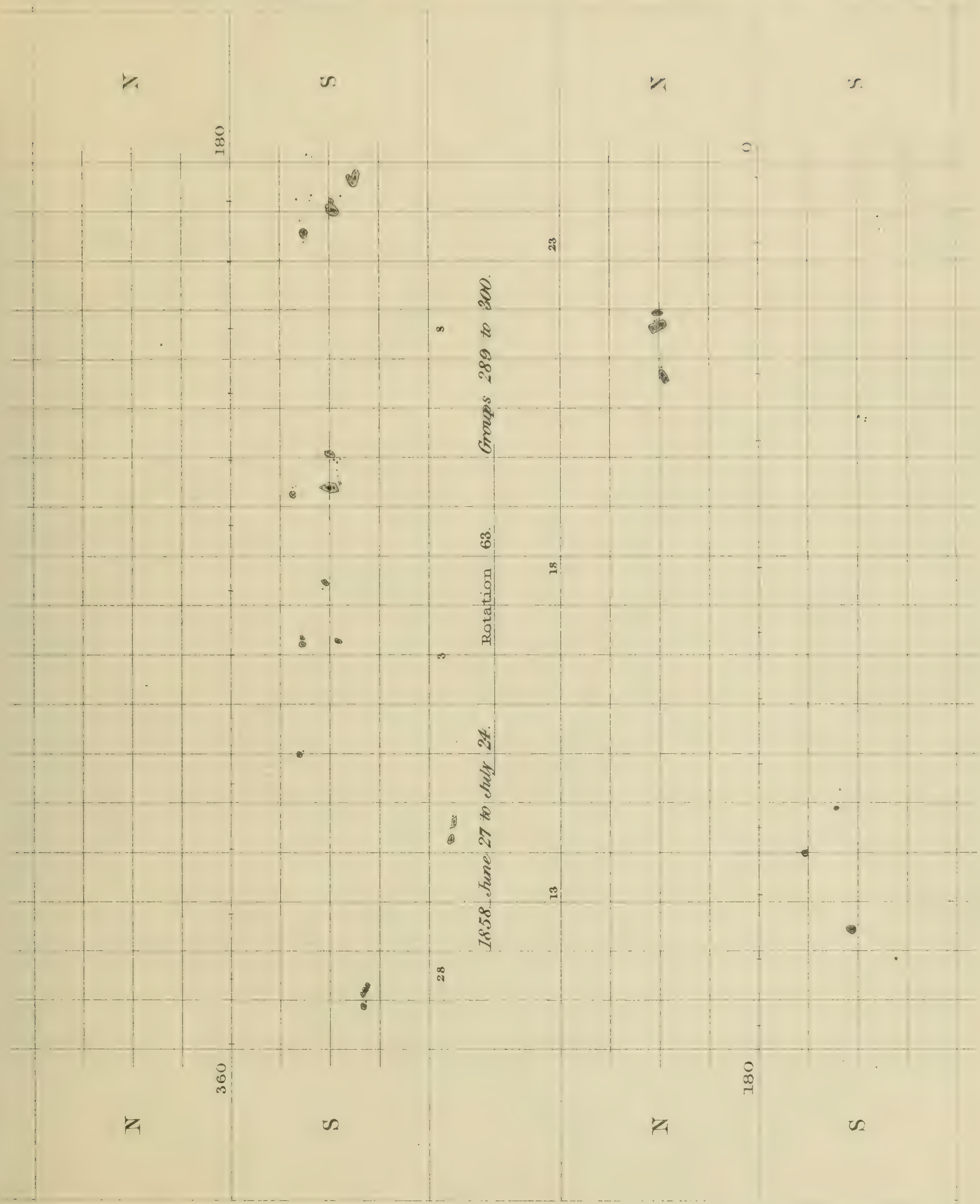


R. C. C. del.		Fredk Dangerfield Lith.



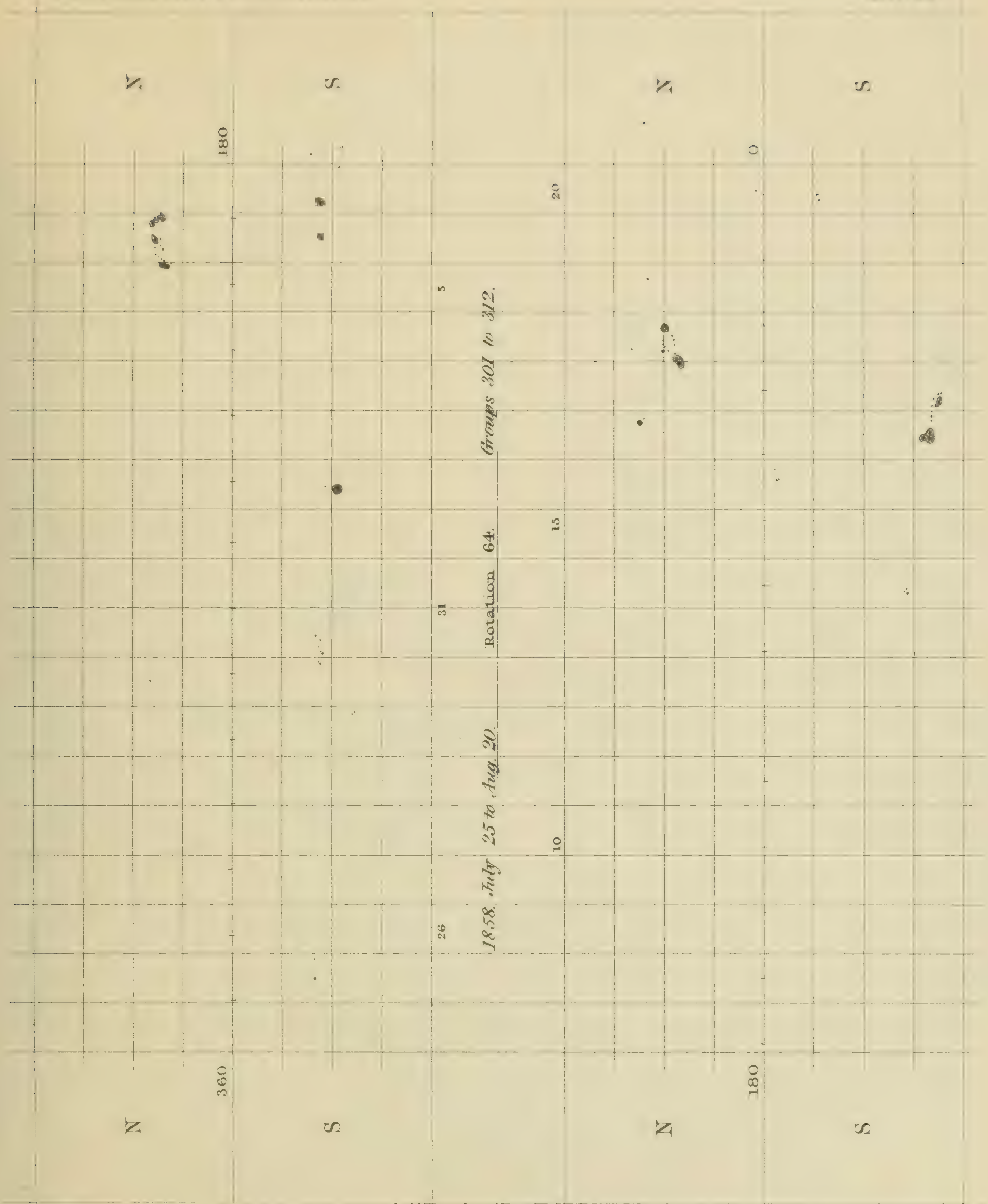
R C C Del

Fredk Dangerfield. Lith

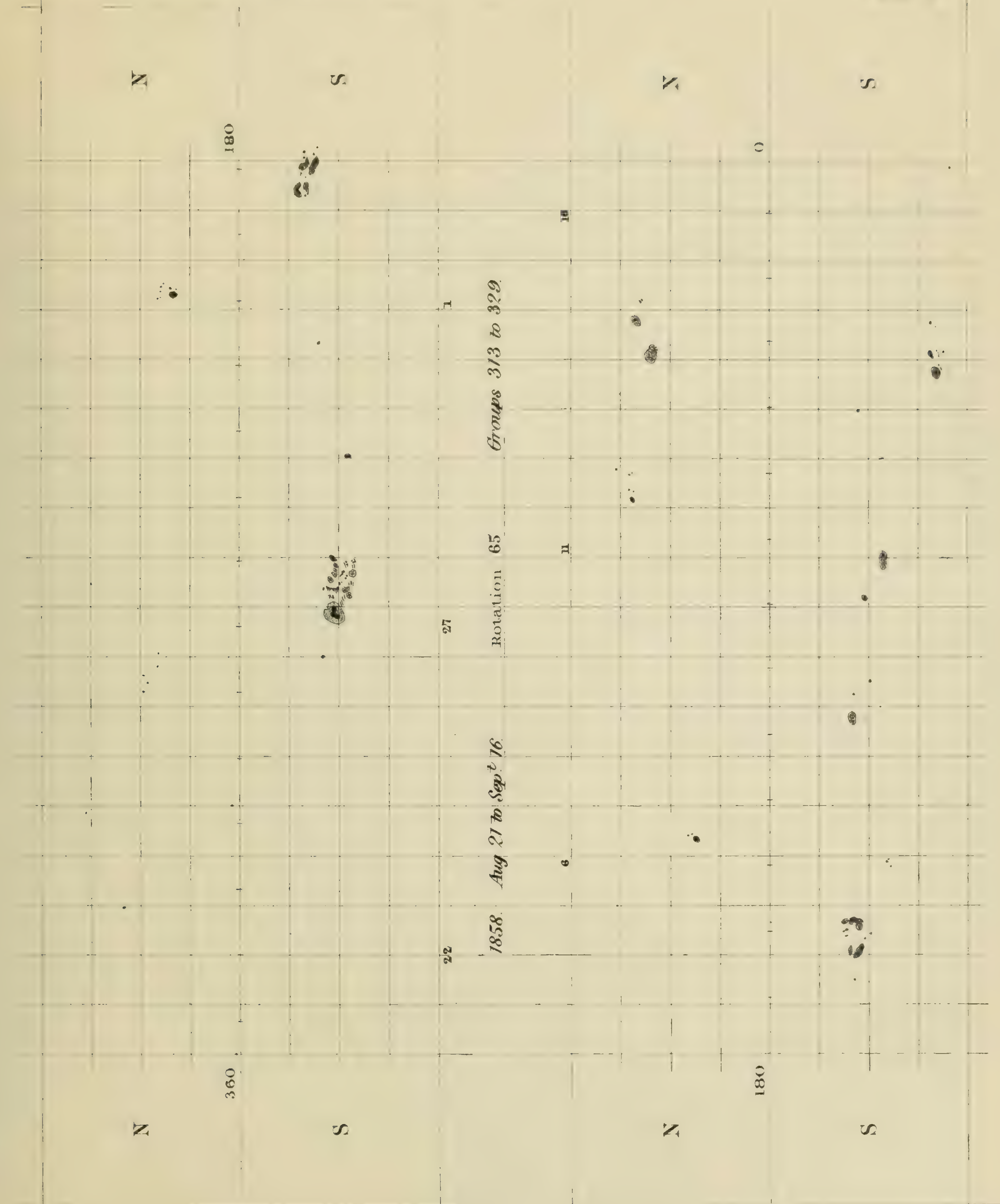


R. C. C. Del.

Fredk Dangerfield Lith.


N
S
N
S
180
0
20
5
Groups 301 to 312.
15
31
Rotation 64.
10
26
1858. July 25 to Aug. 20.
360
180
N
S
N
S

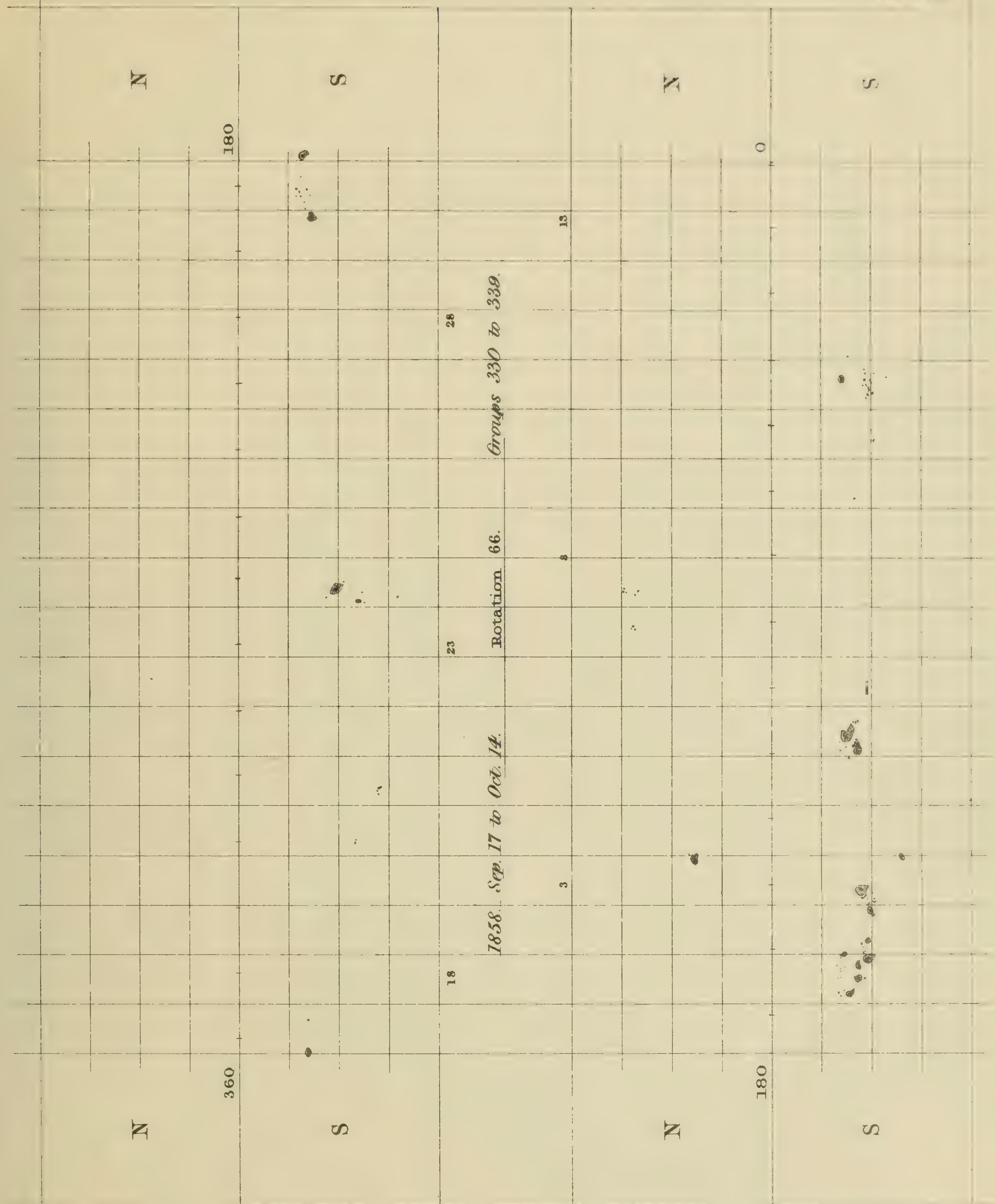
R. C. C. Del.



R. C. Del. Fredk Dangerfield Lith.

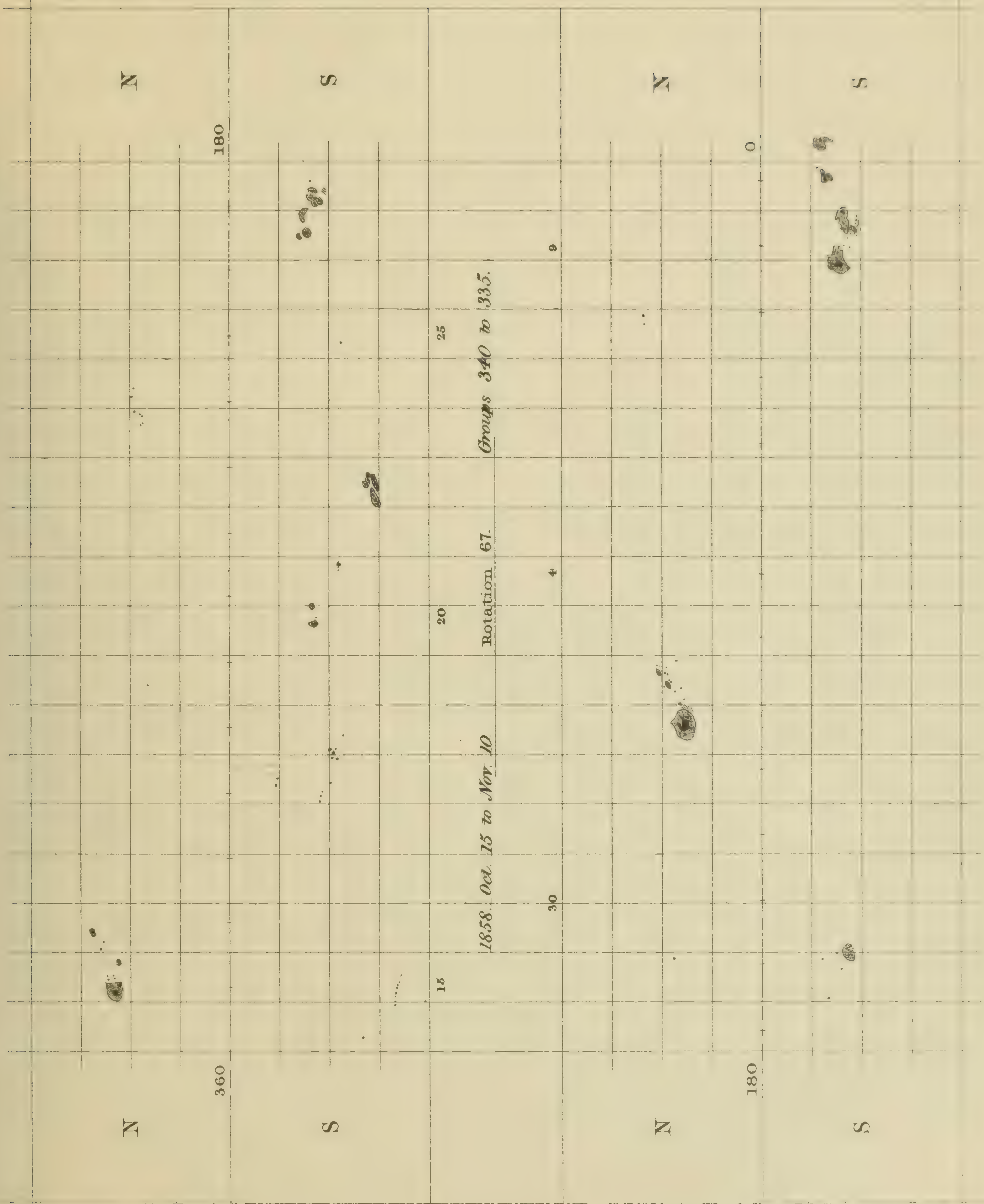
OBS OF SOLAR SPOTS BY R.C.CARRINGTON

PLATE. 68.



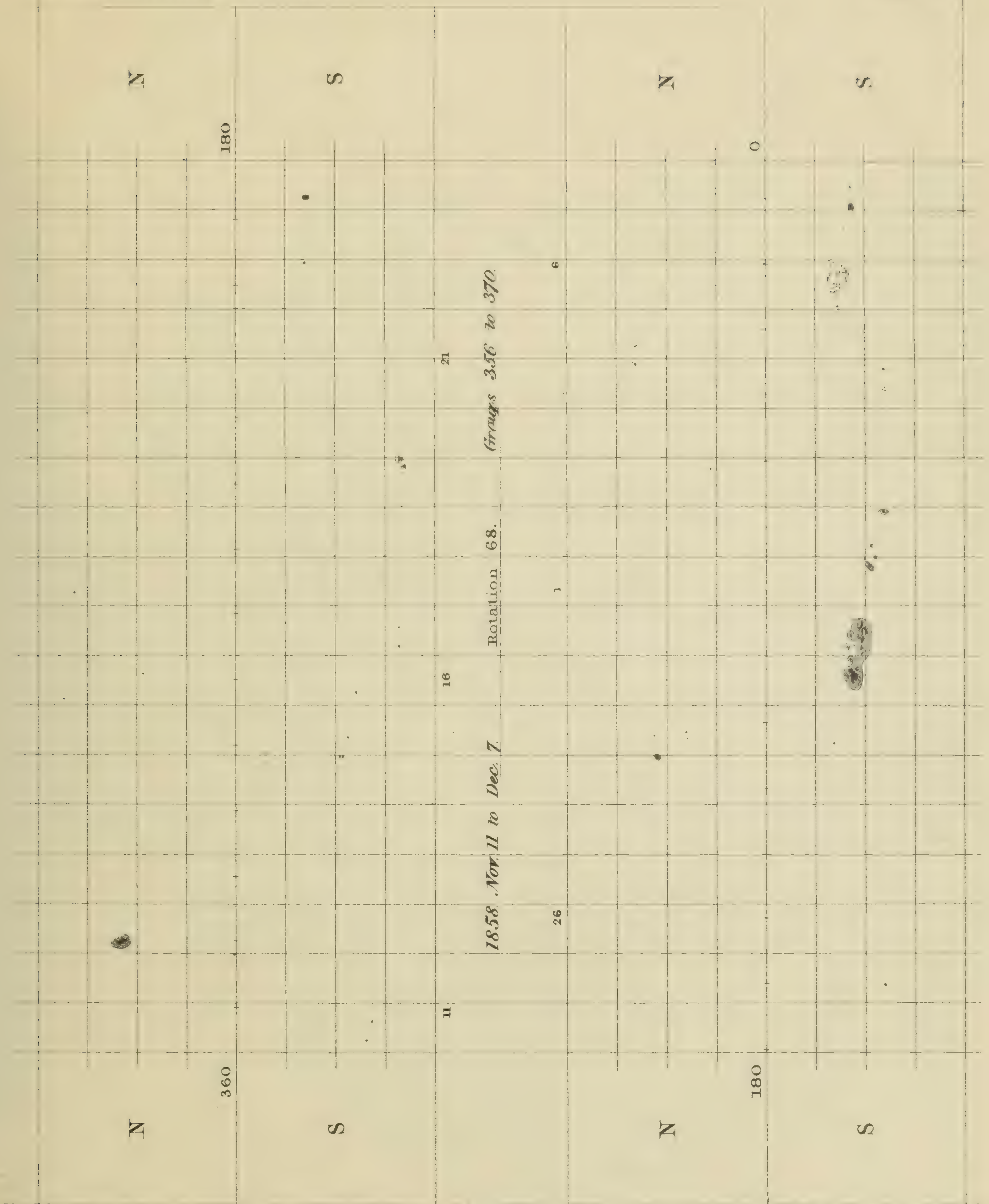
R. C. C. Del.

Fredk. Dangerfield Lith.



R. C. C. Del.

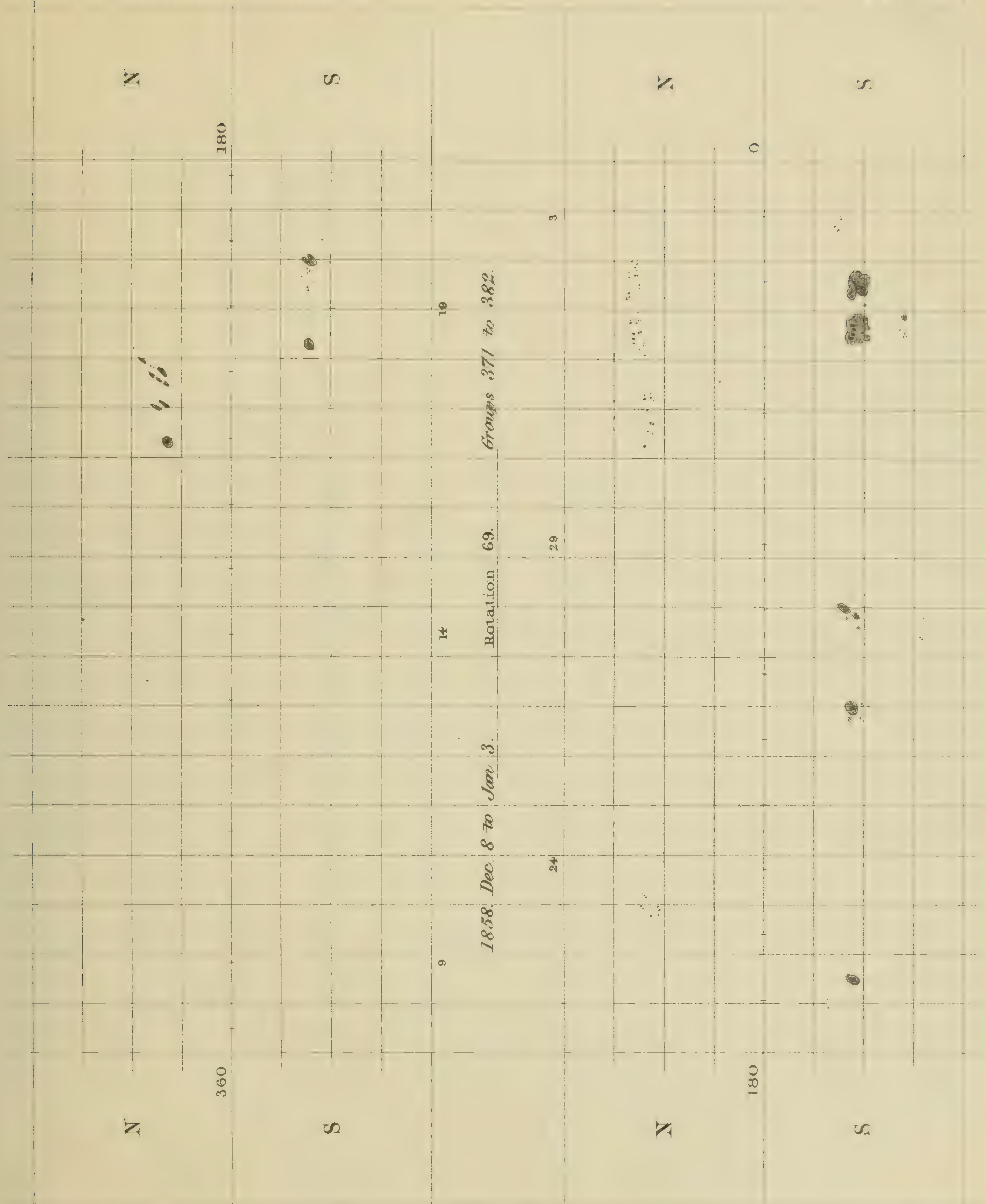
Fredk. Dangerfield Lith.

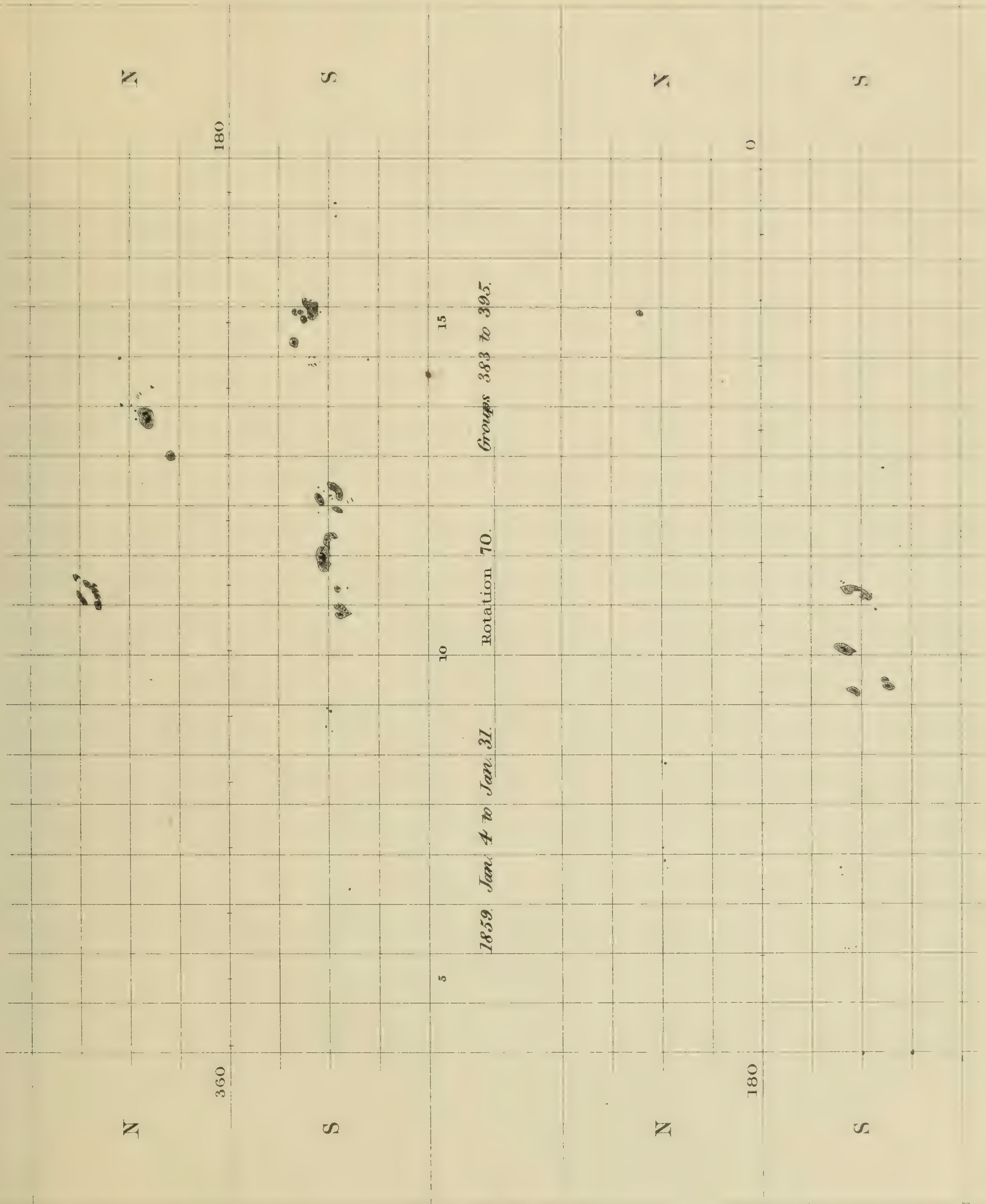


R. C. C. Del.

Fredk. Dangerfield Lith.

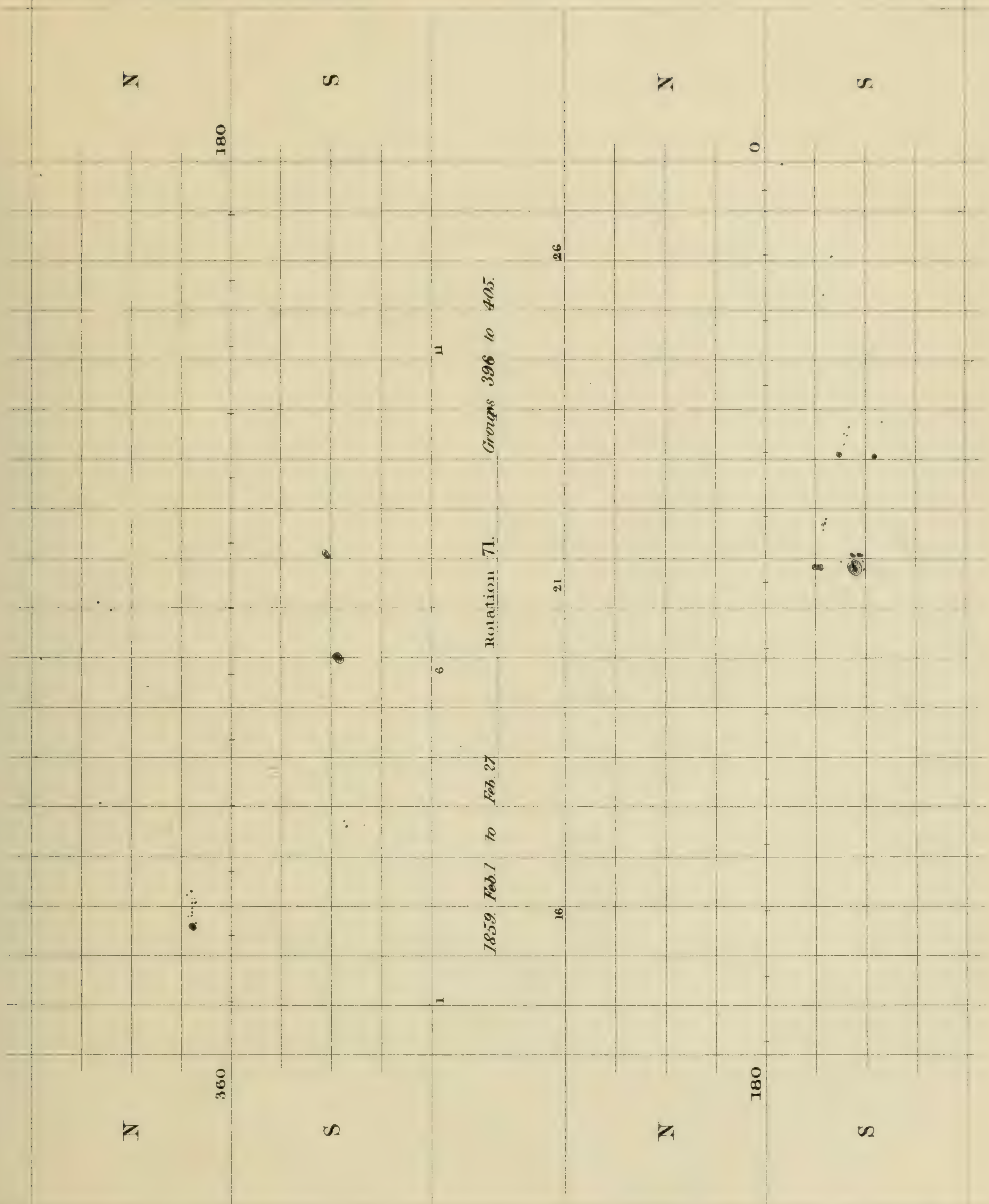
b


1858, Dec. 8 to Jan. 3. Rotation 69. Groups 371 to 382.
N
S
N
S
180
0
360
180
3
19
29
14
24
9

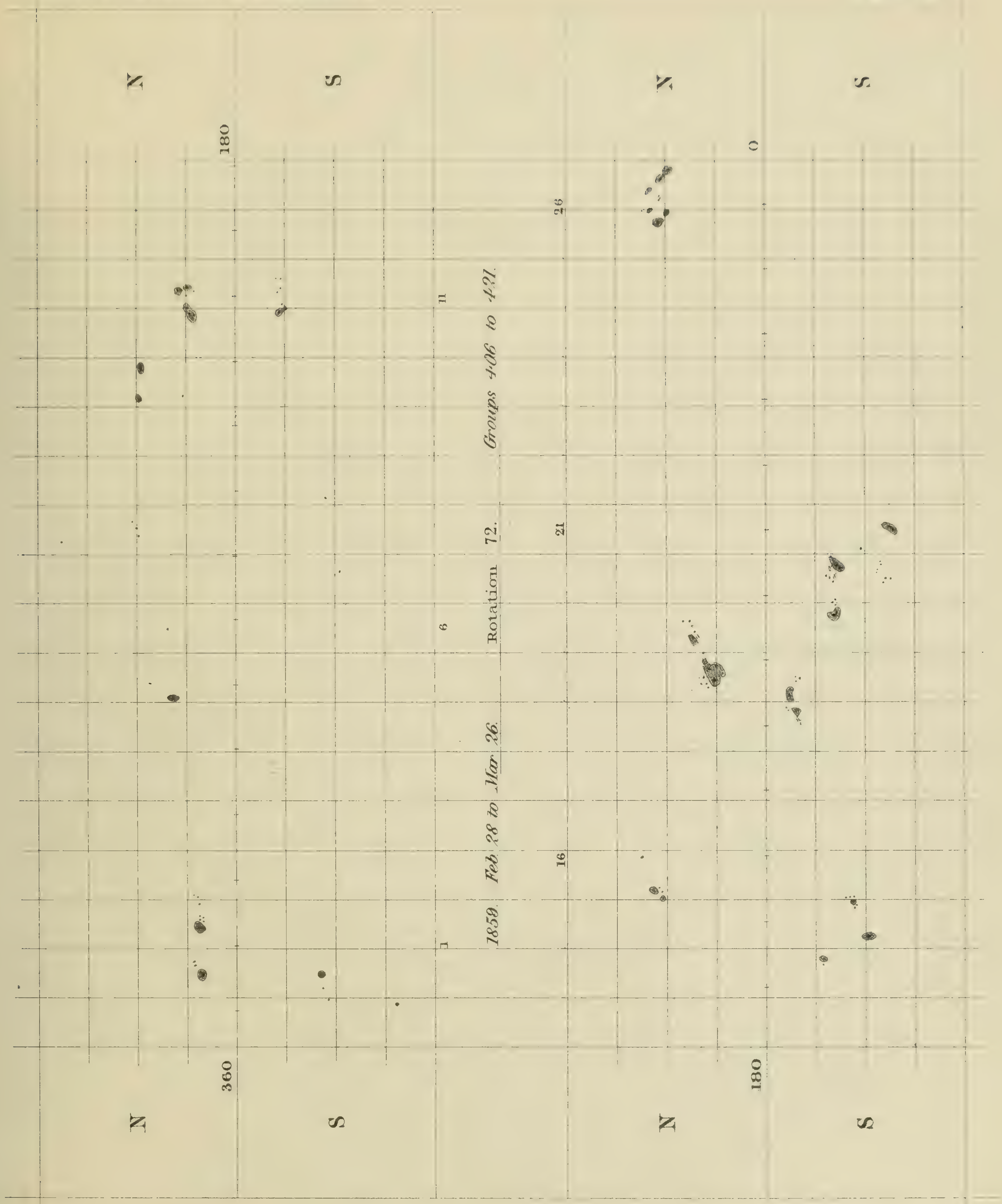


R C C Del.

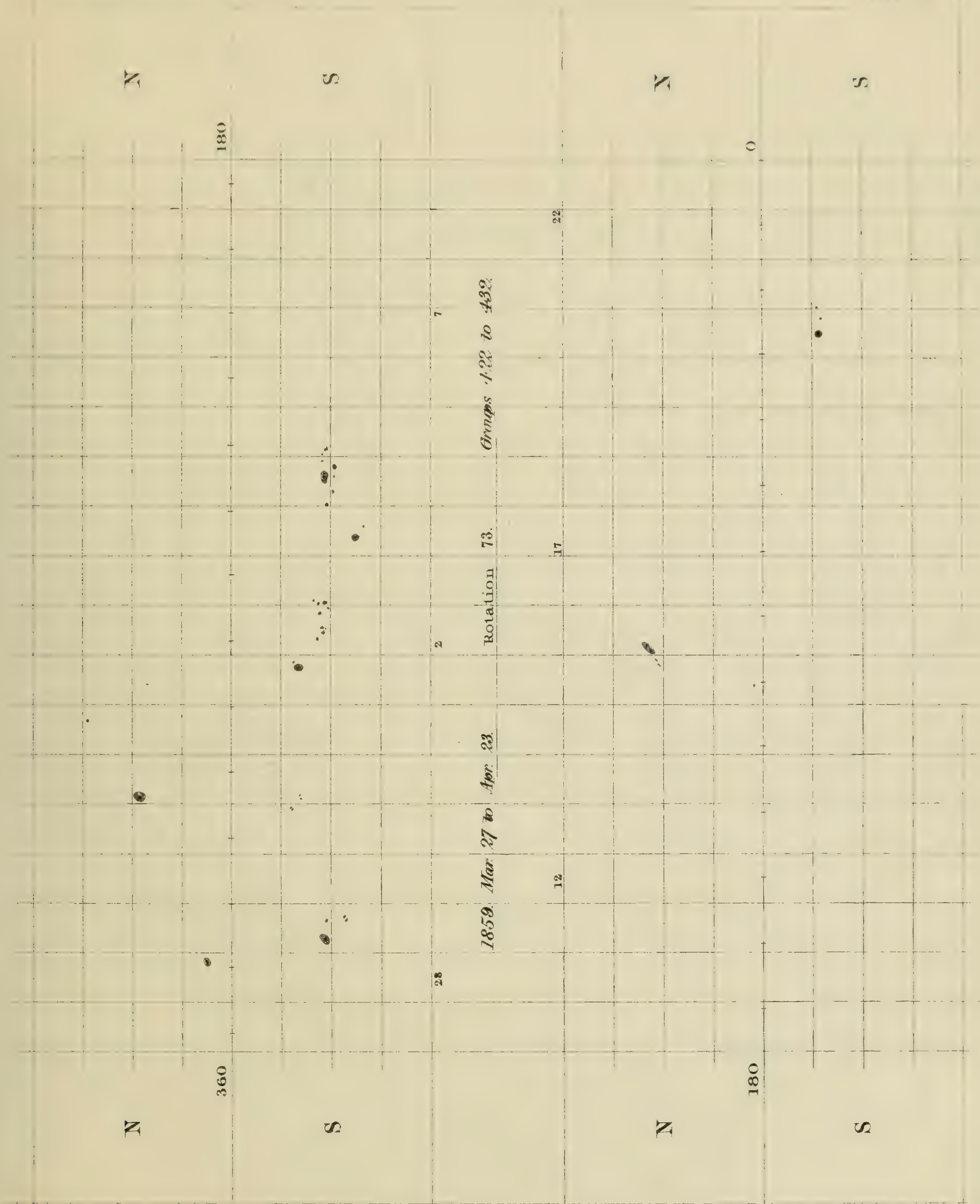
Fredk Dangerfield Lith.



R. C. C. Del. Fredk. Dangerfield. Lith.

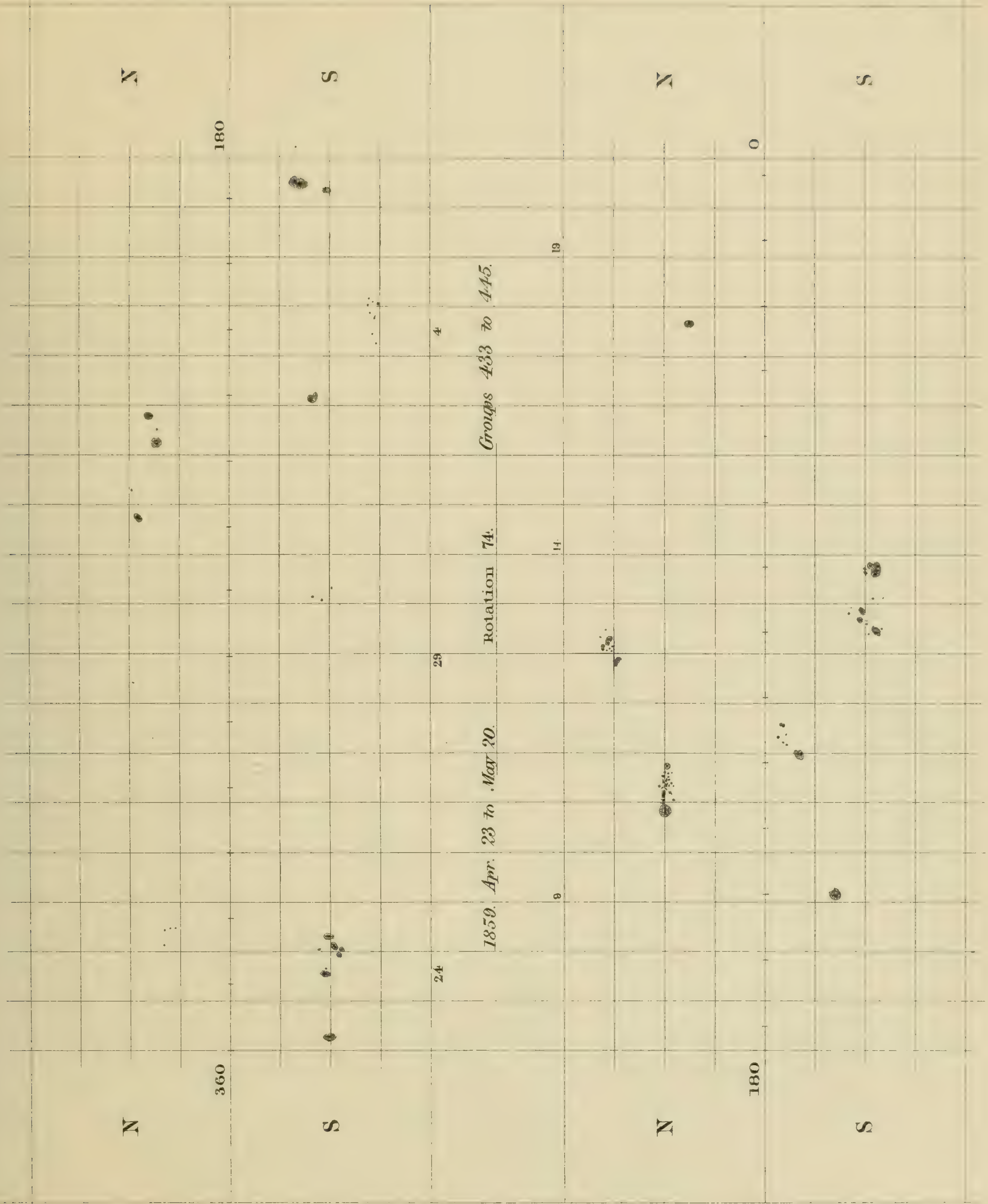


R. C. C. Del. Fredk Dangerfield. Lith.



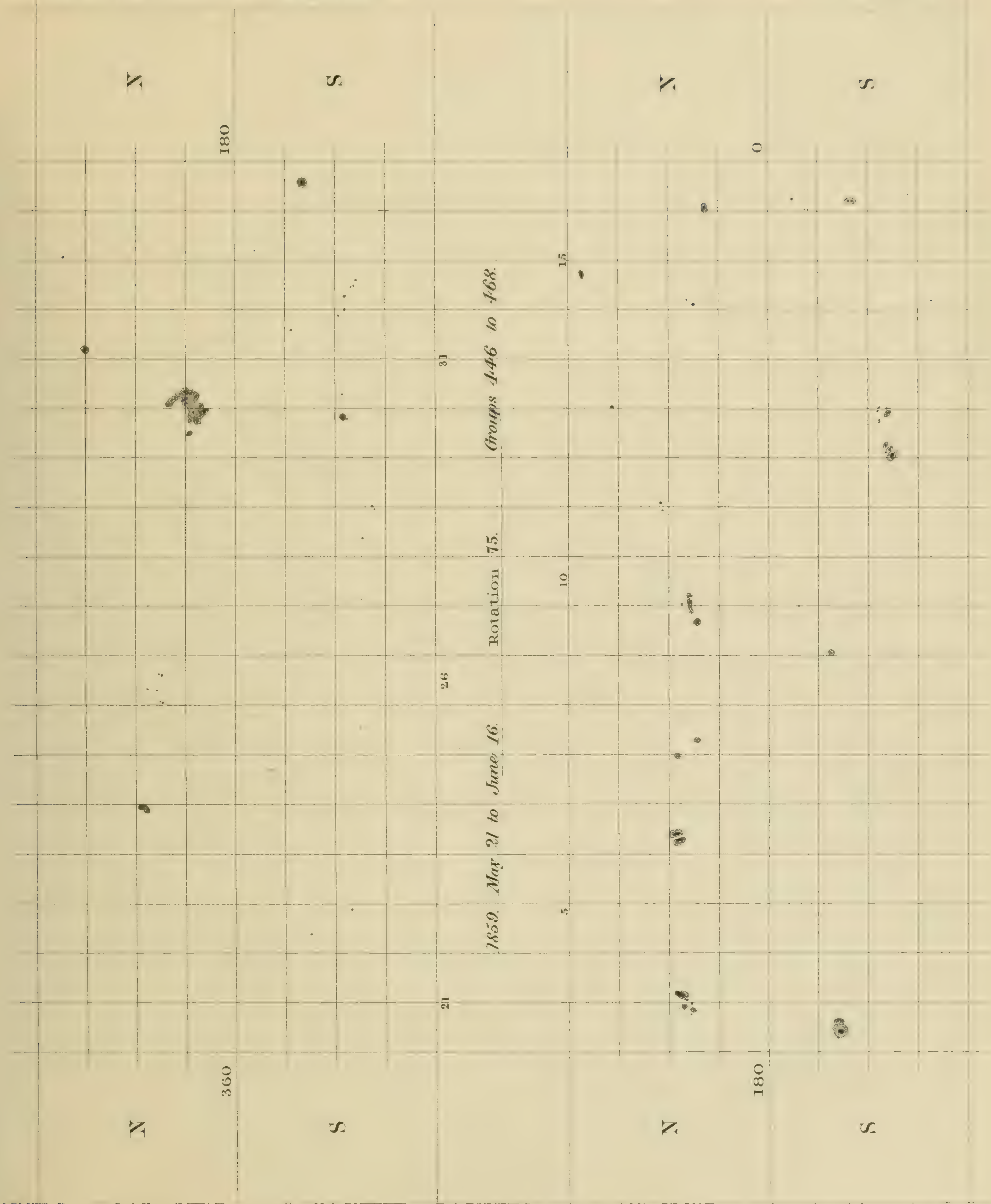
R.C.C. Del.

Fredk Dangerfield Lith

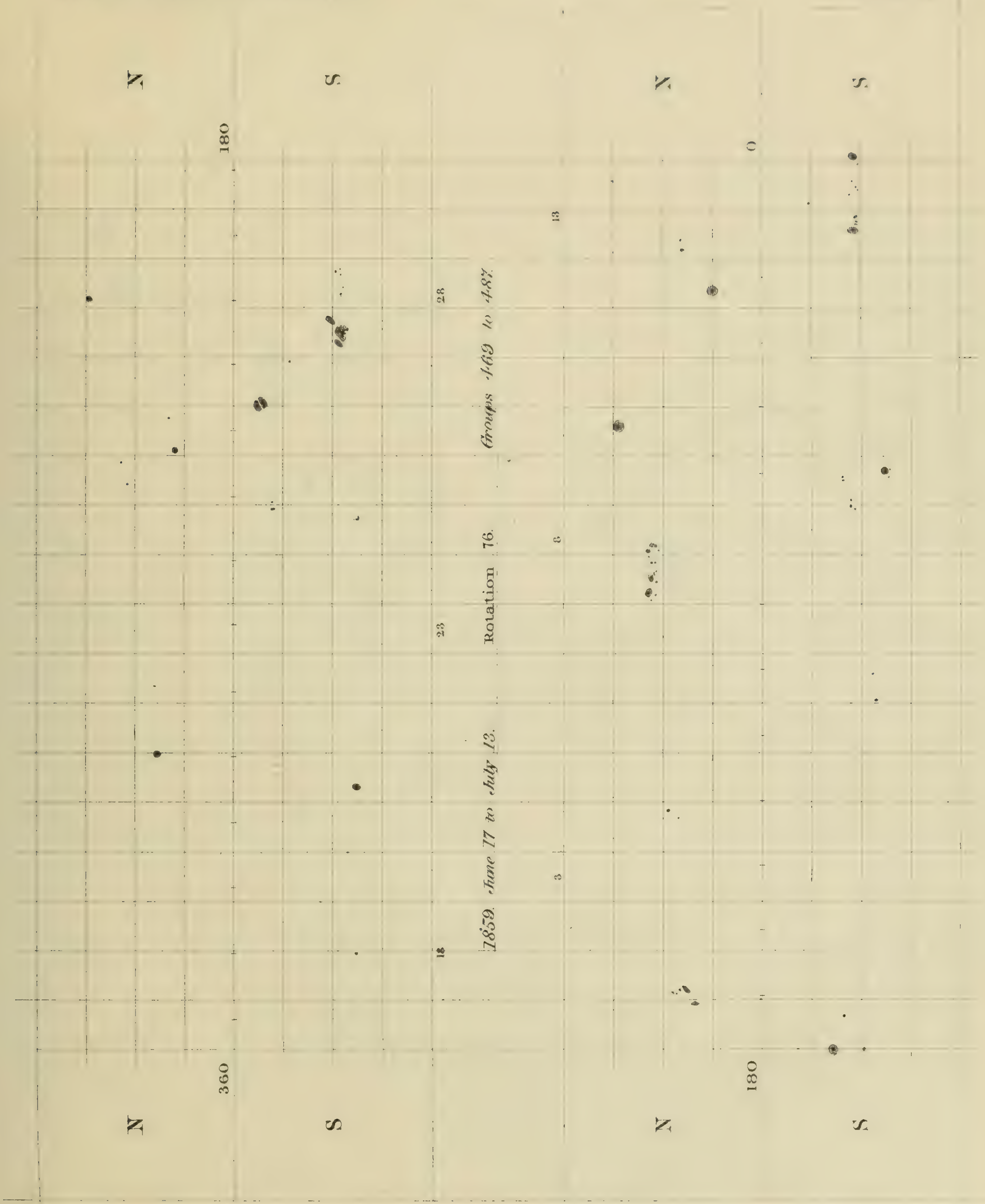


R. C. C. Del.

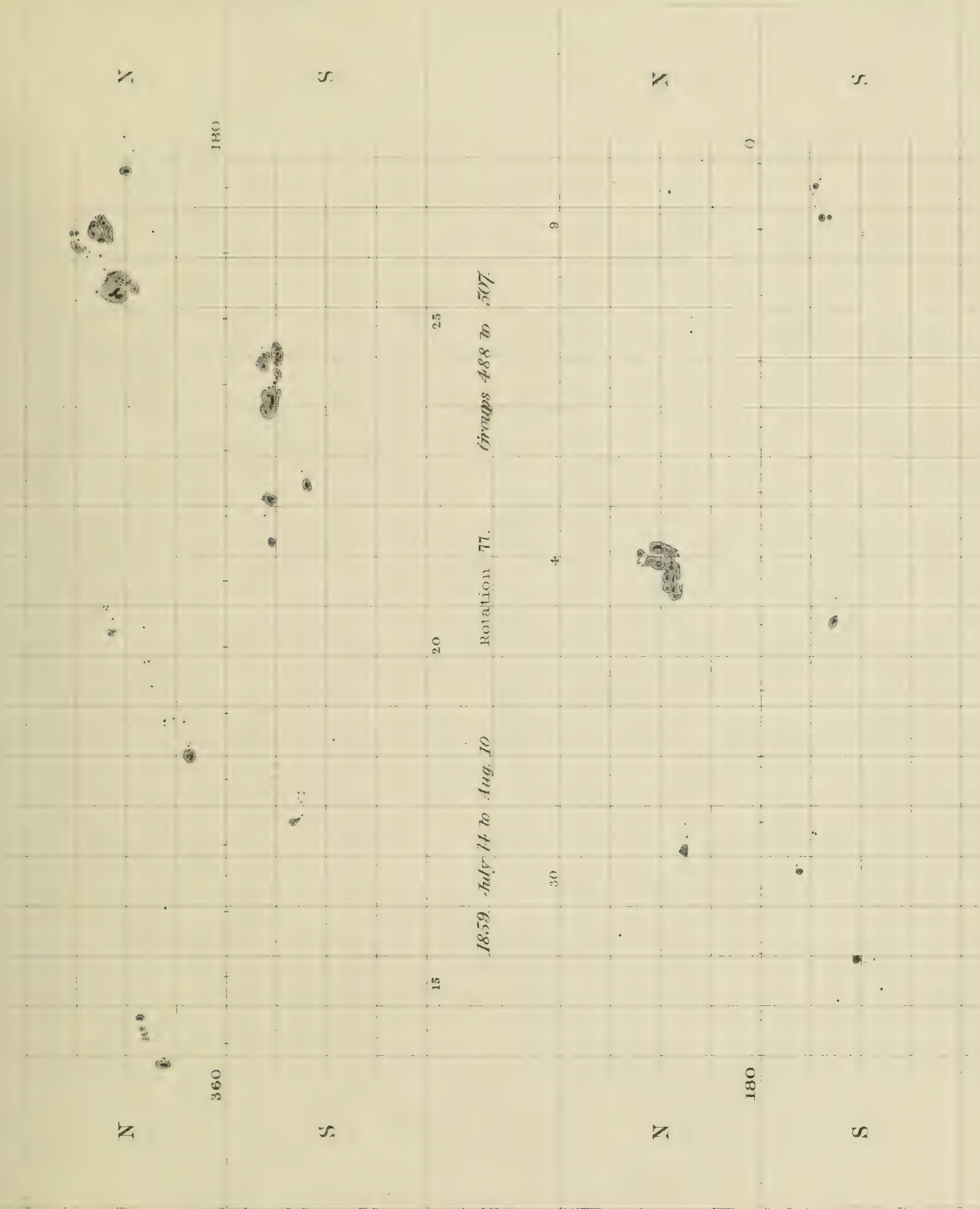
Fred^k. Dangerfield. Lith.


1859. May 21 to June 16. Rotation 75. Groups 446 to 468.
N
S
N
S
180
0
360
180
31
26
21
15
10
5

R. C. C. del.

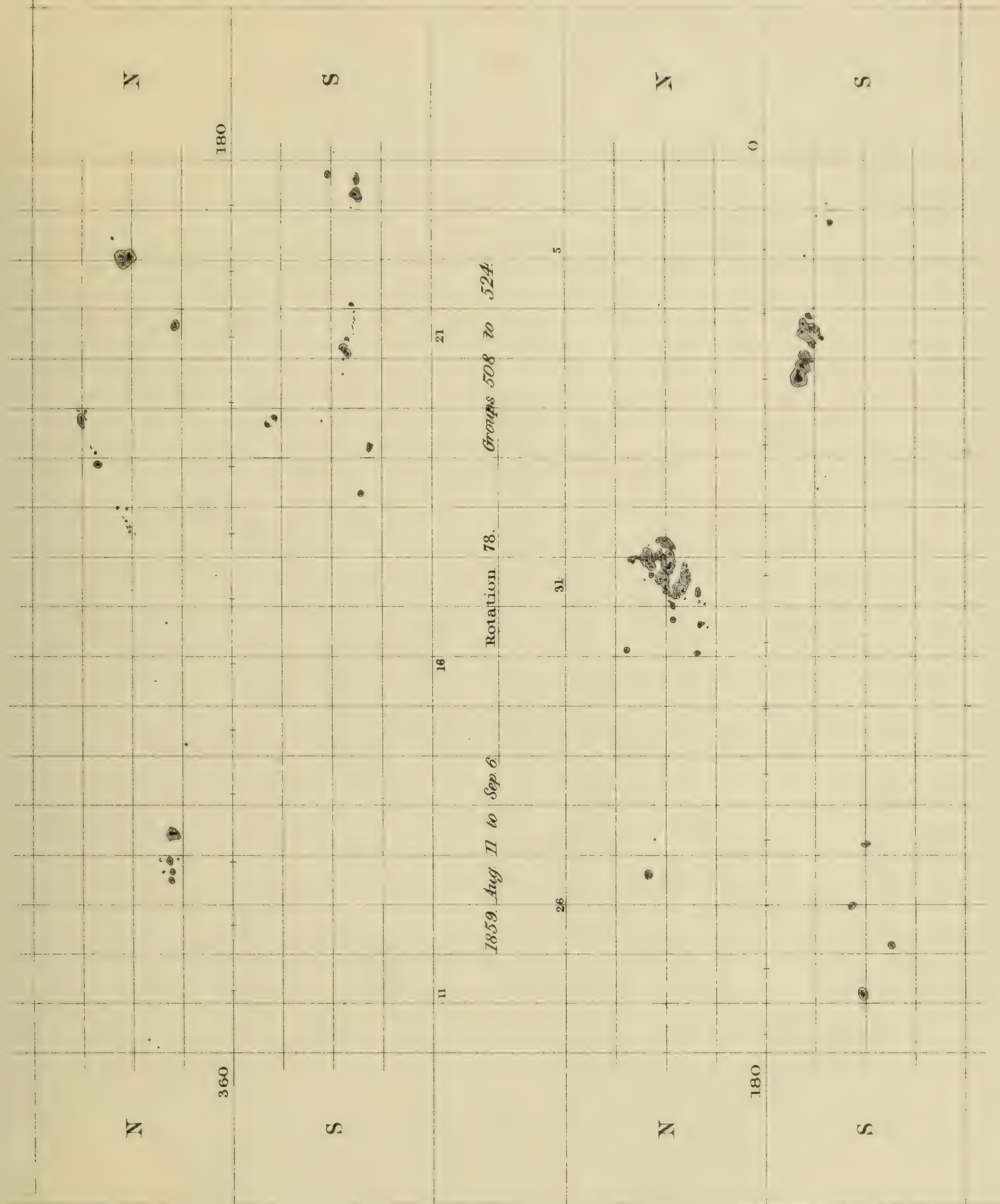

1859. June 17 to July 13.
Rotation 76.
Groups 469 to 487.
N
S
N
S
180
0
360
180
28
23
18
13
8
3

R. C. C. Del.



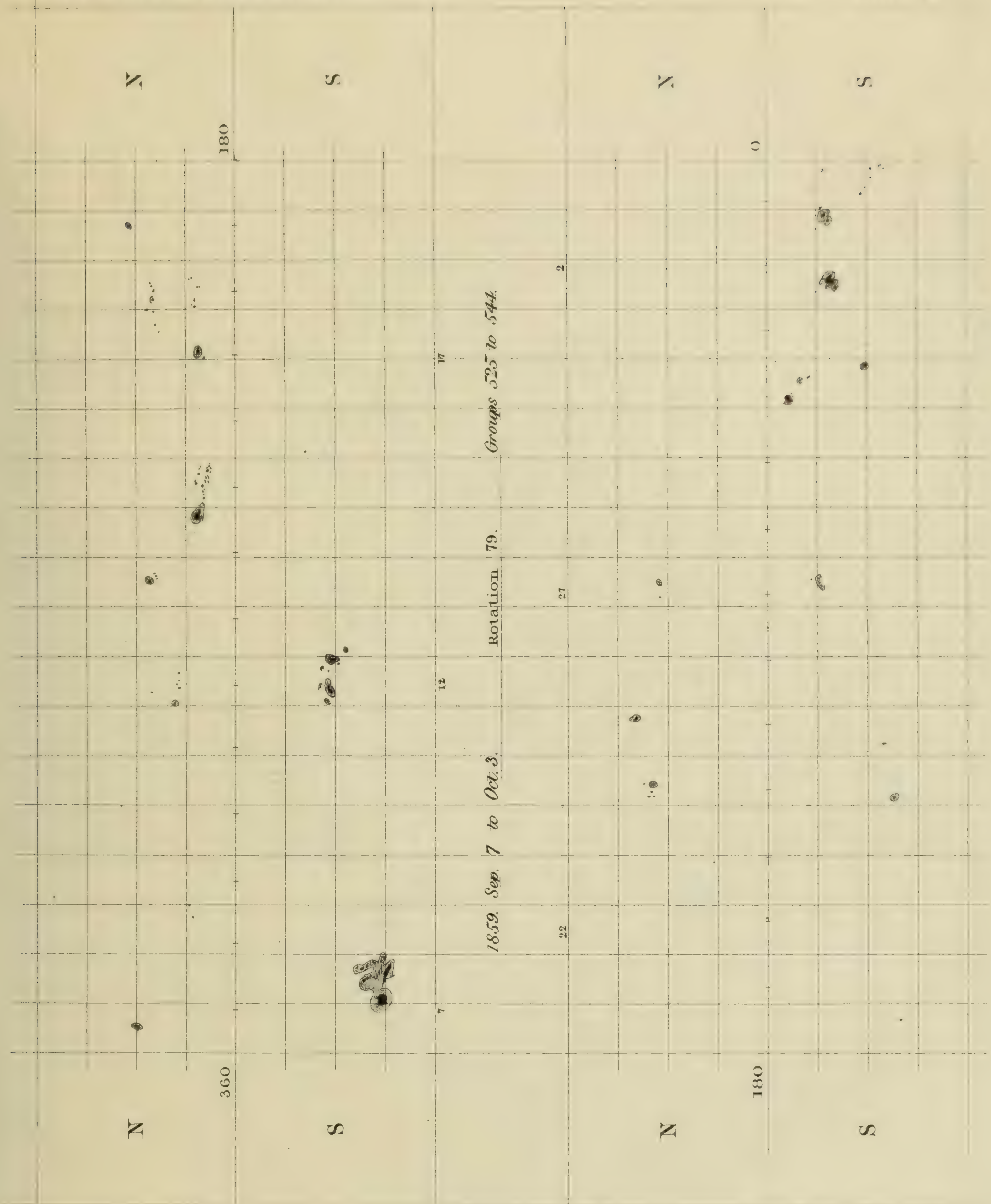
R. C. C. Del.

Fredk Dangerfield. Lith.

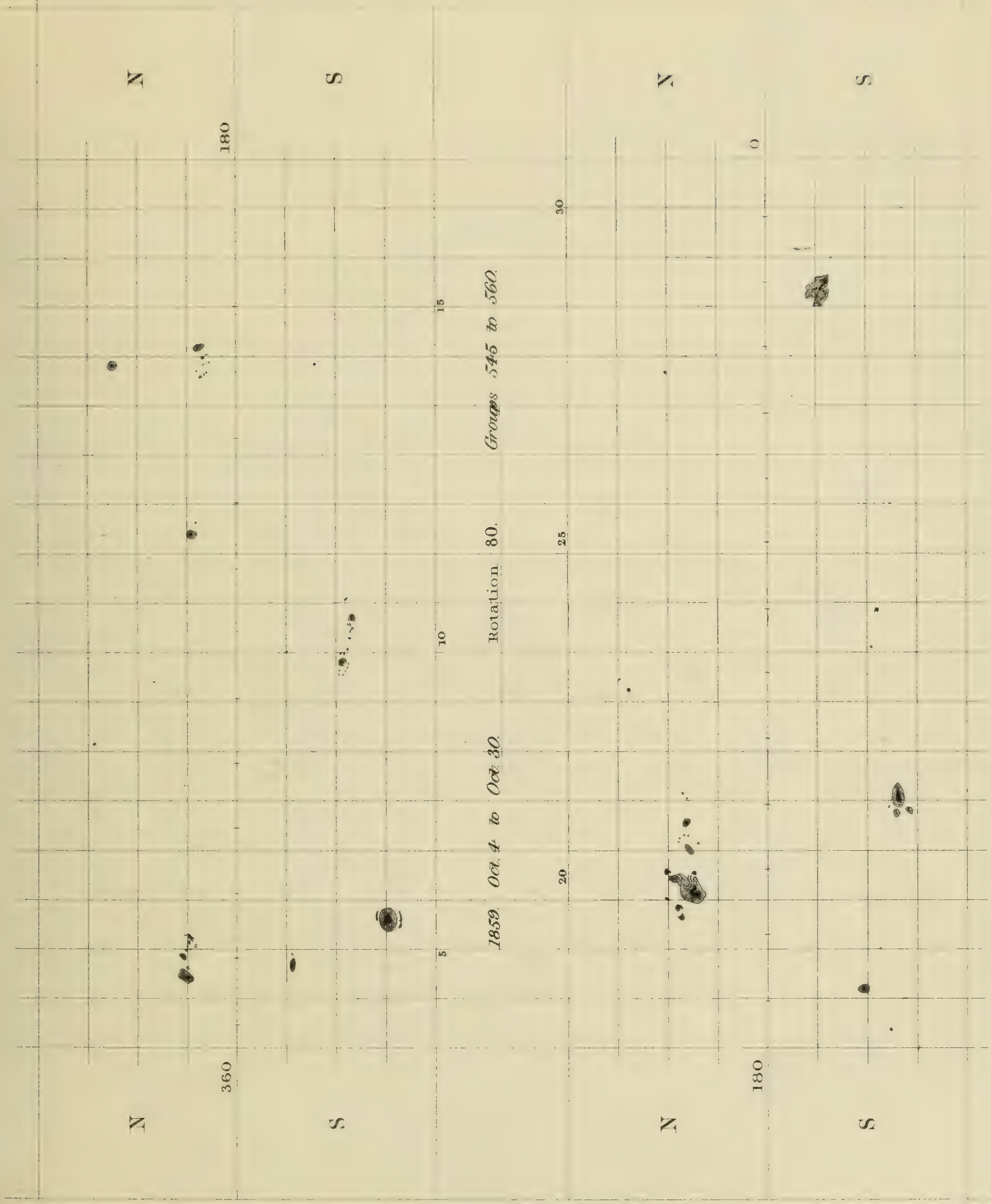


R. C. C. Del.

Fredk Bangerfield, Lith.

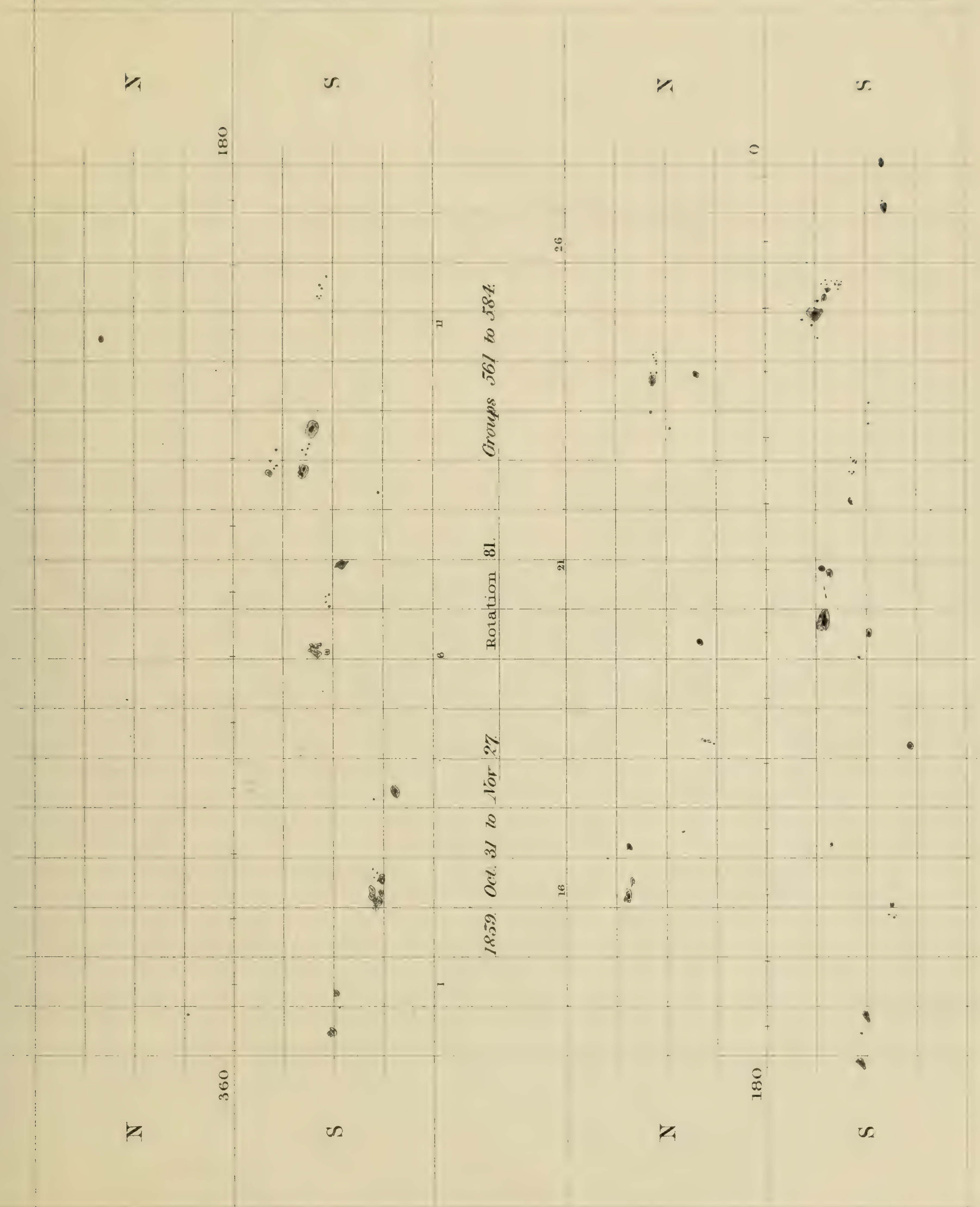

N
S
N
S
180
0
360
180
1859. Sep. 7 to Oct. 3. Rotation 79. Groups 525 to 544.
2
17
27
12
22
7
N
S
N
S

R. C. C. Del.



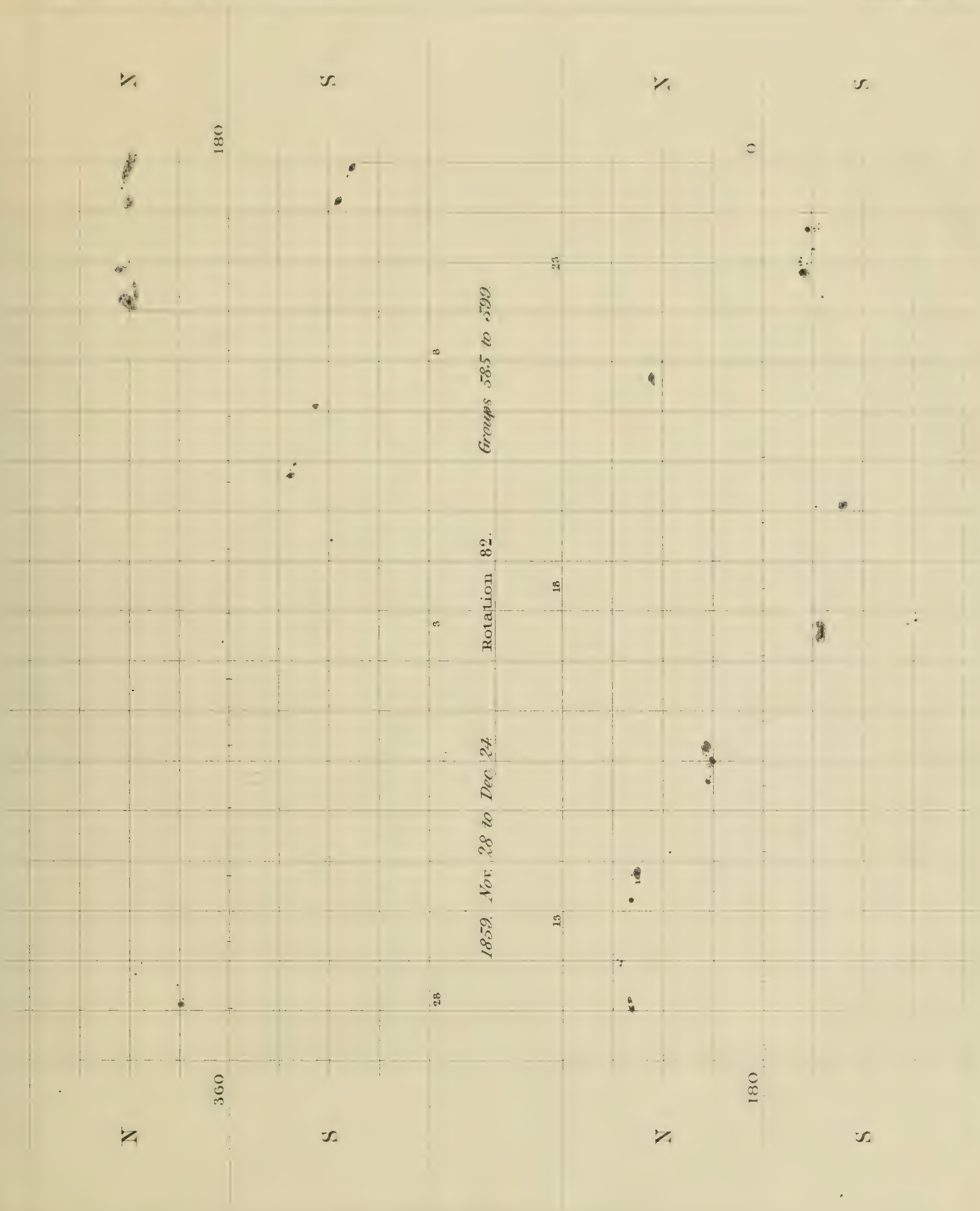
R. C. C. Del.

Fredk Dangerfield. Lith.

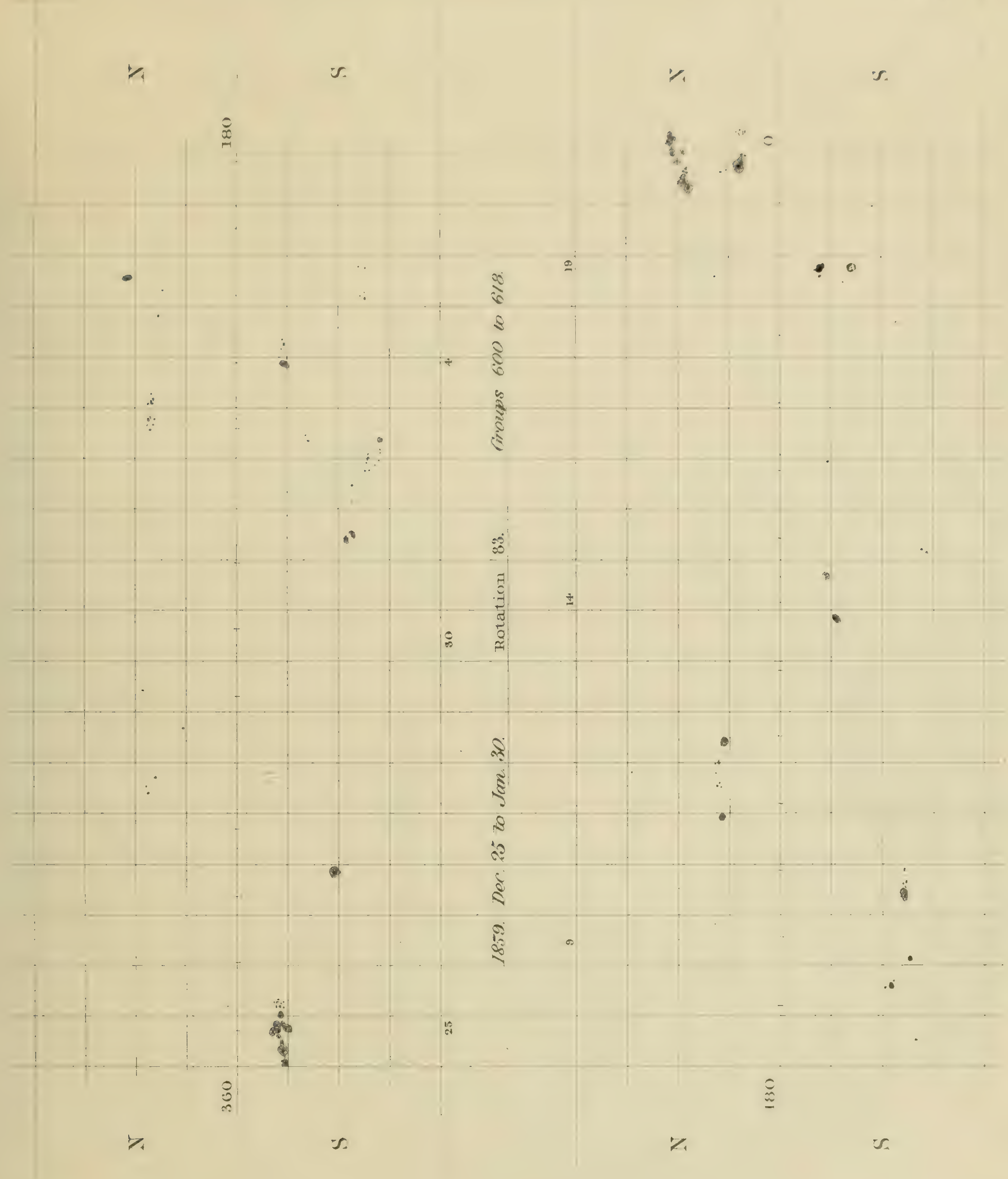


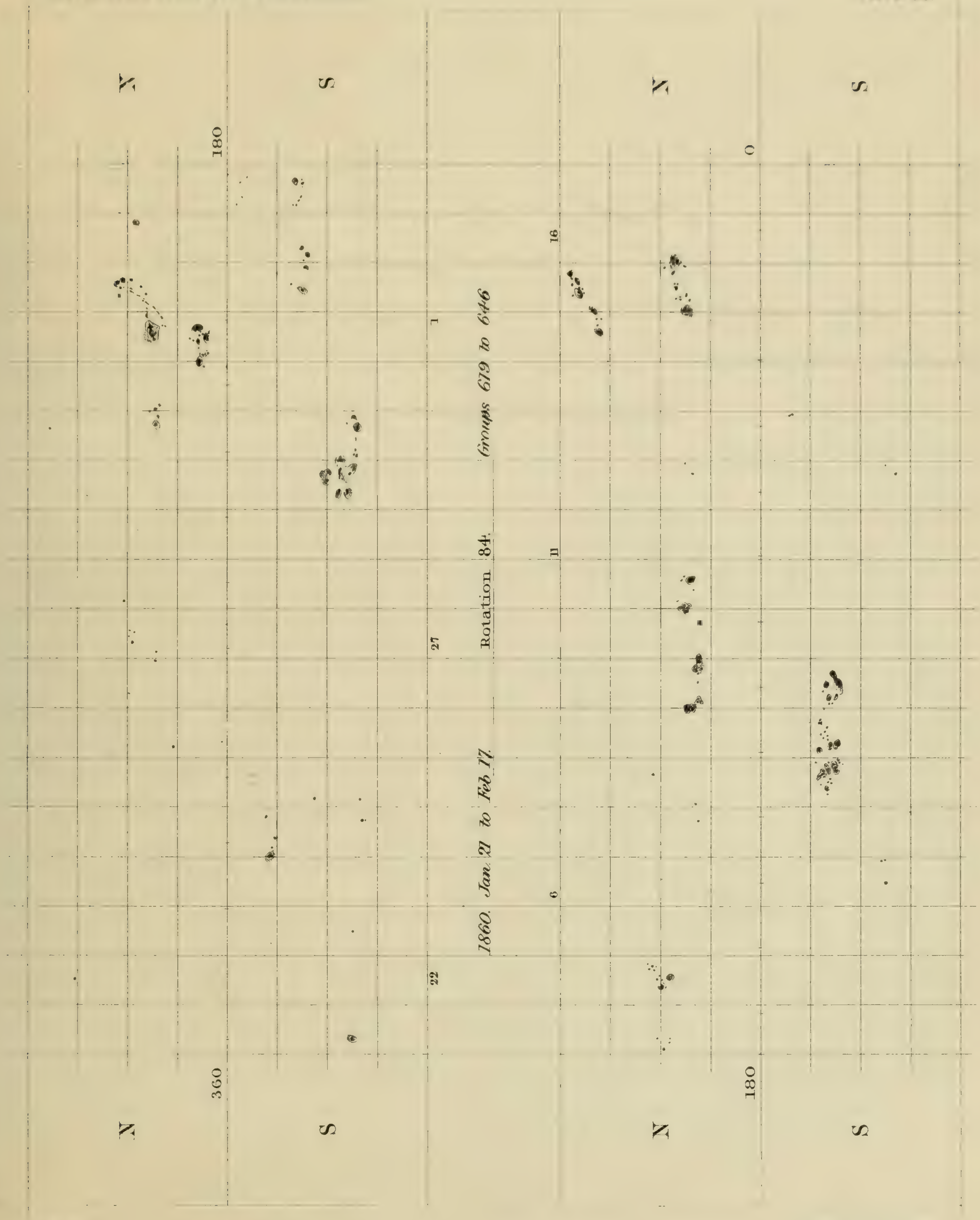
R C C Del.

Fredk Bungerfield Lith



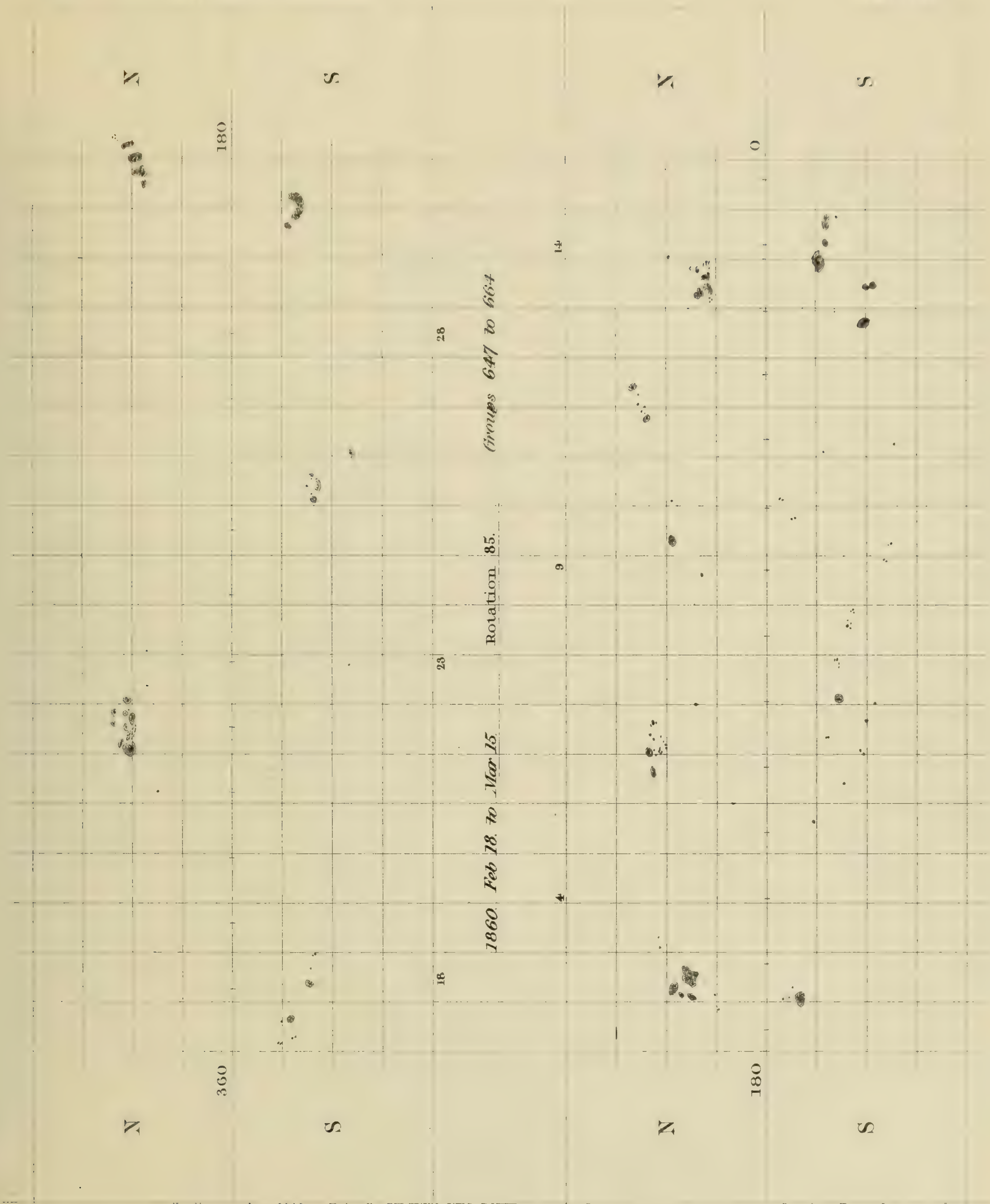
1859. Nov. 28 to Dec. 24.
Rotation 82.
Groups 585 to 590
N
S
180
360
0


1859. Dec 25 to Jan 30. Rotation 83. Groups 600 to 618.
N
S
N
S
180
360
180
0
25
30
4
9
14
19



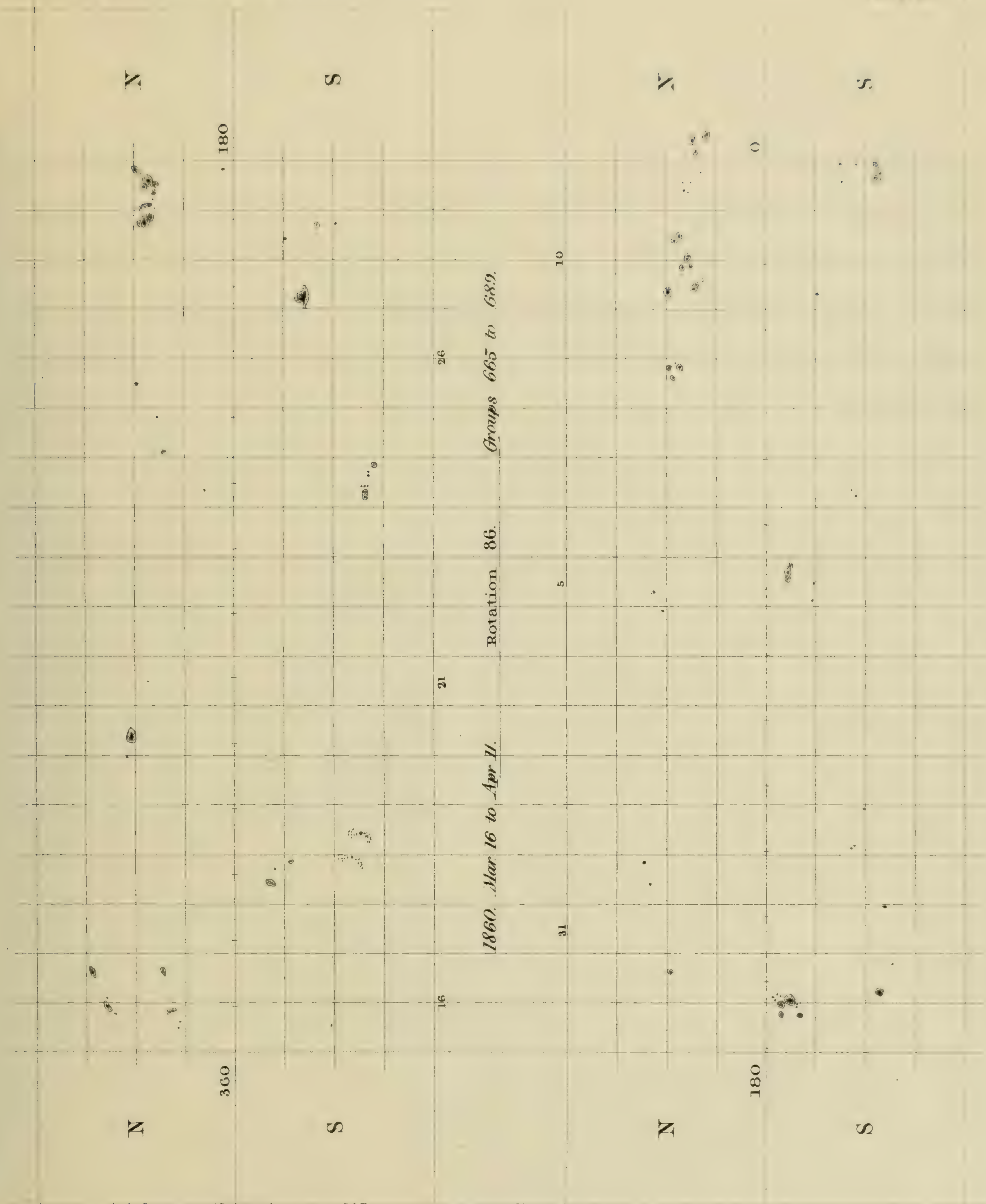
R. C. C. Del.

Fredk. Dangerfield Lith.



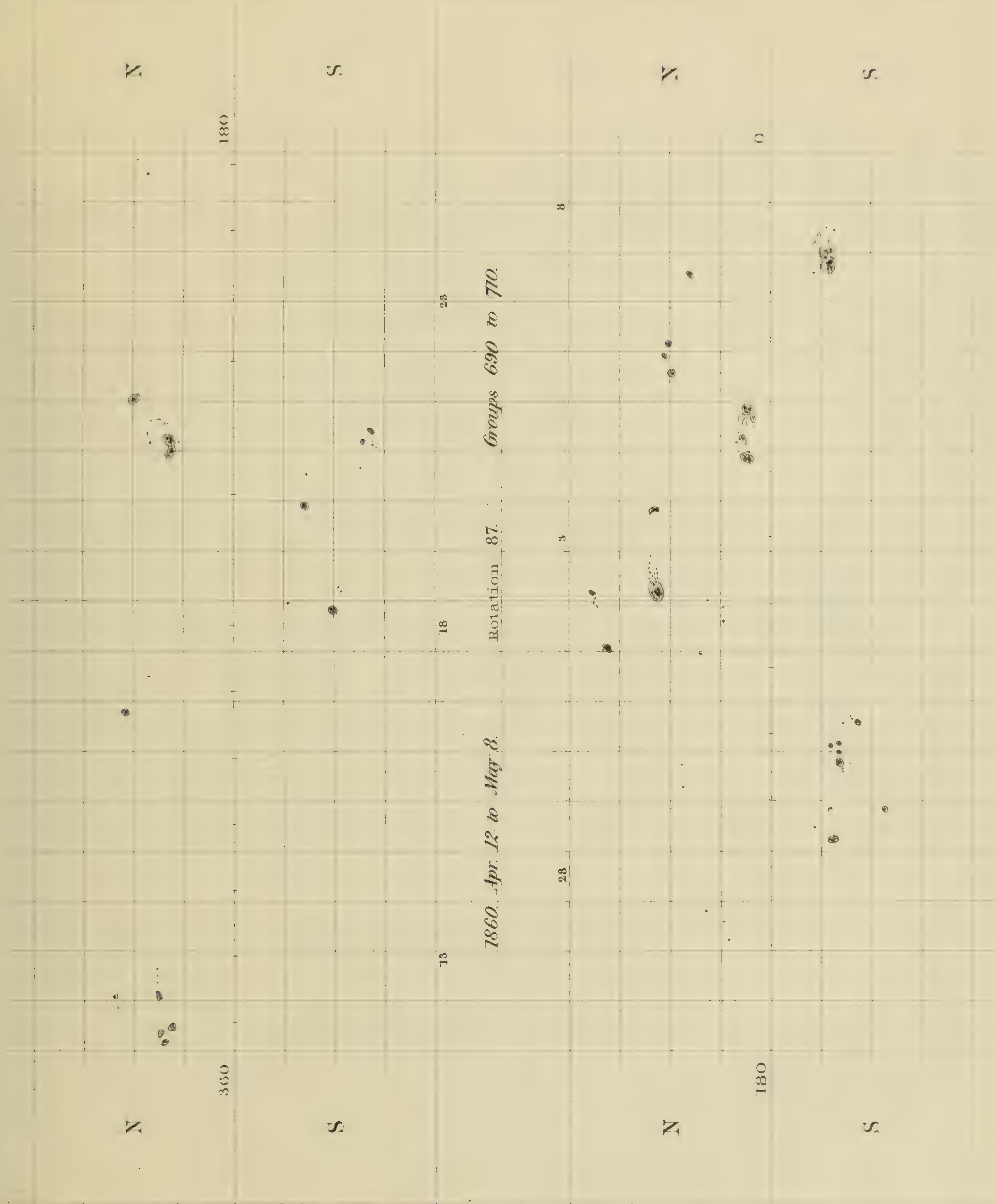
R. C. C. Del

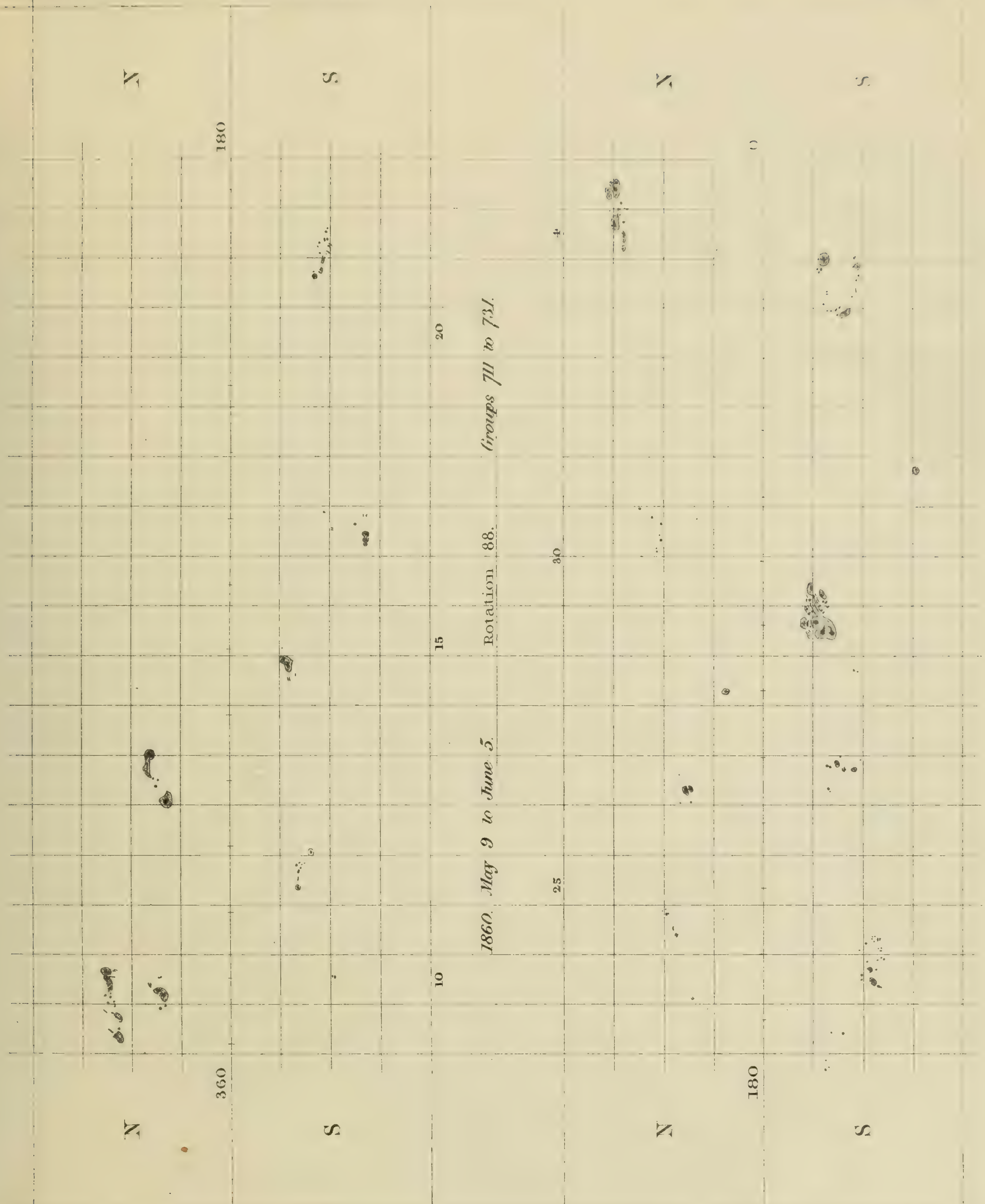
Fredk Dangerfield. Lith



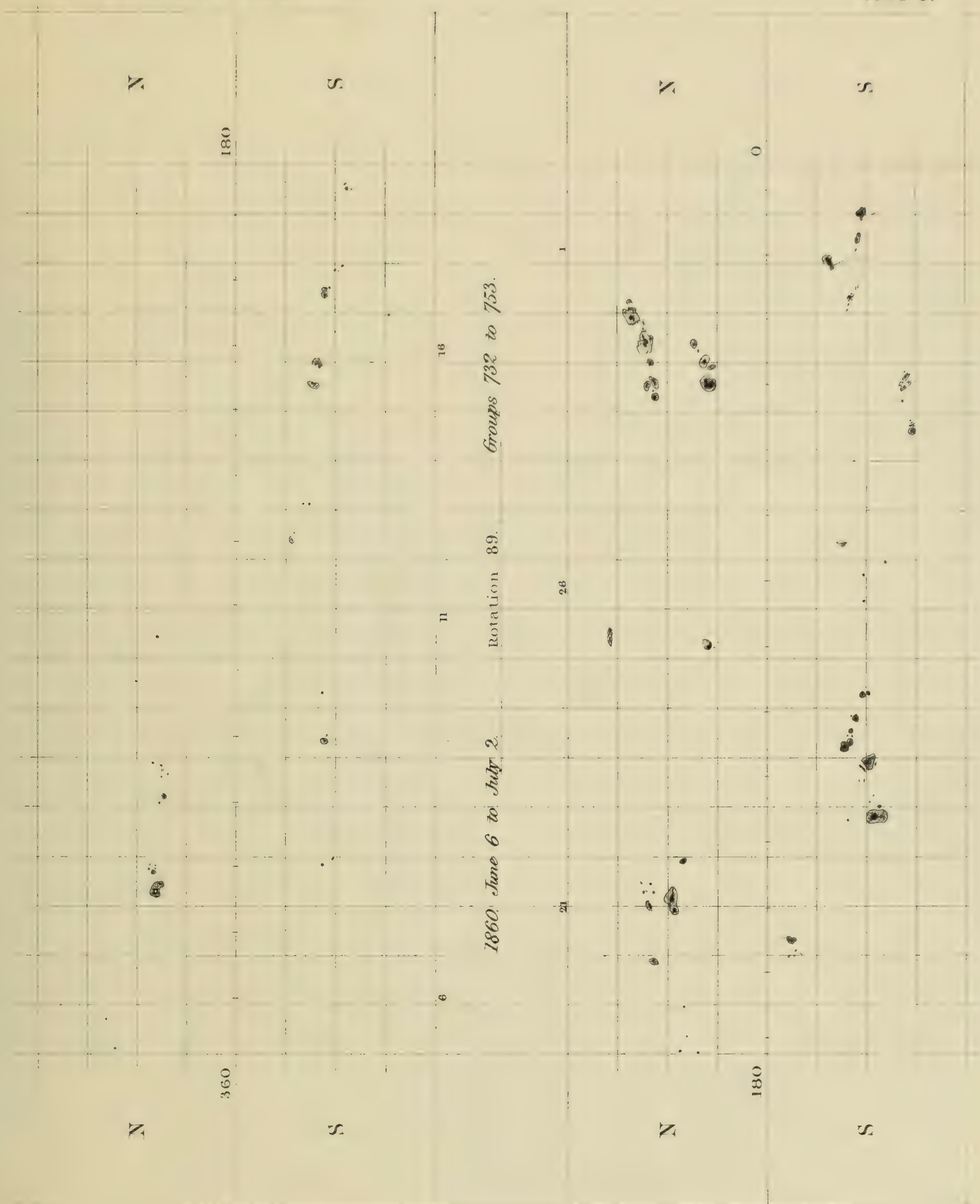
R. C. C. Del.

Fred^k ...gerfield. Lith.

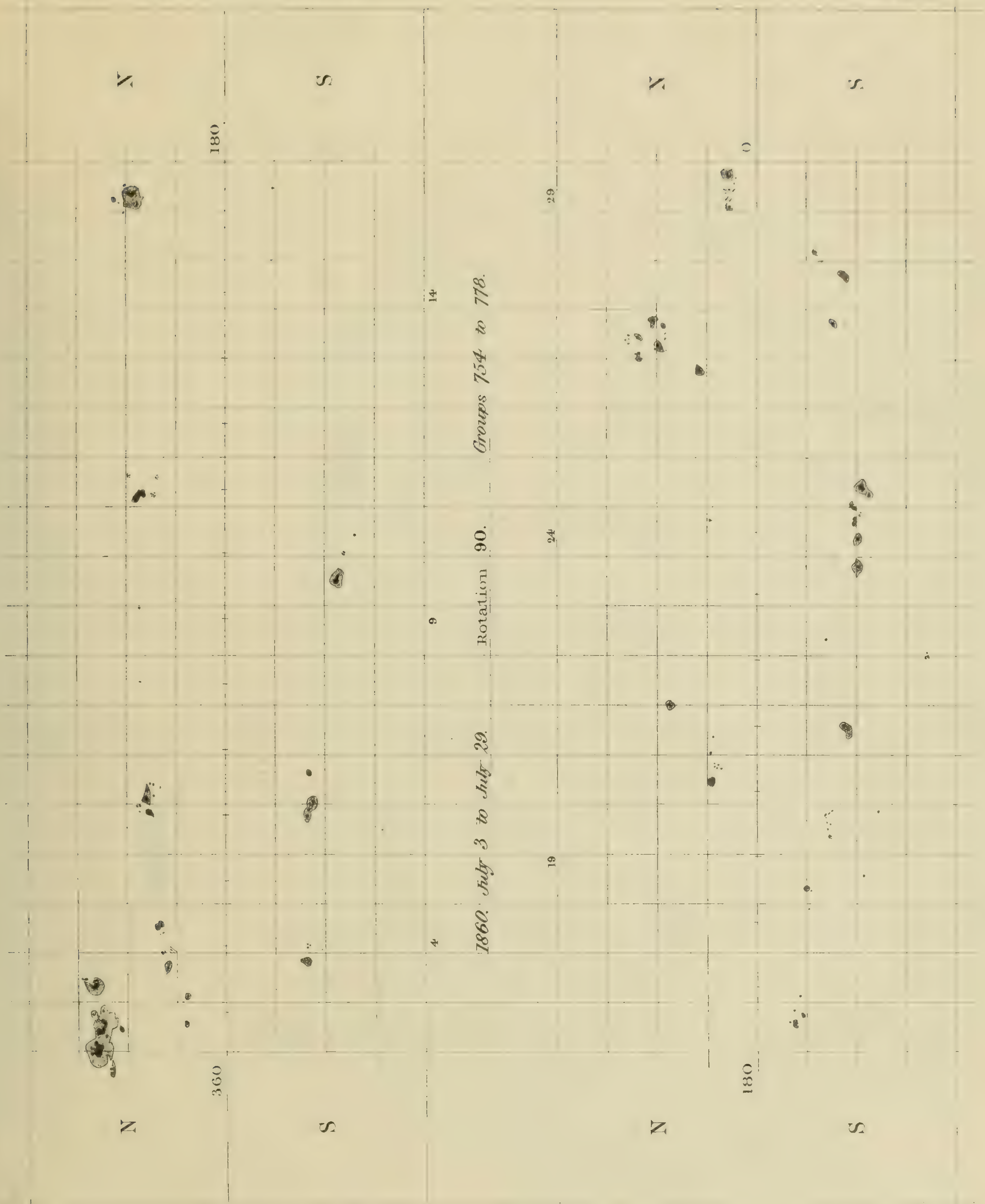

1860. Apr. 12 to May 8. Rotation 87. Groups 690 to 710.
N.
S.
180
360
0
8
23
3
18
28
13

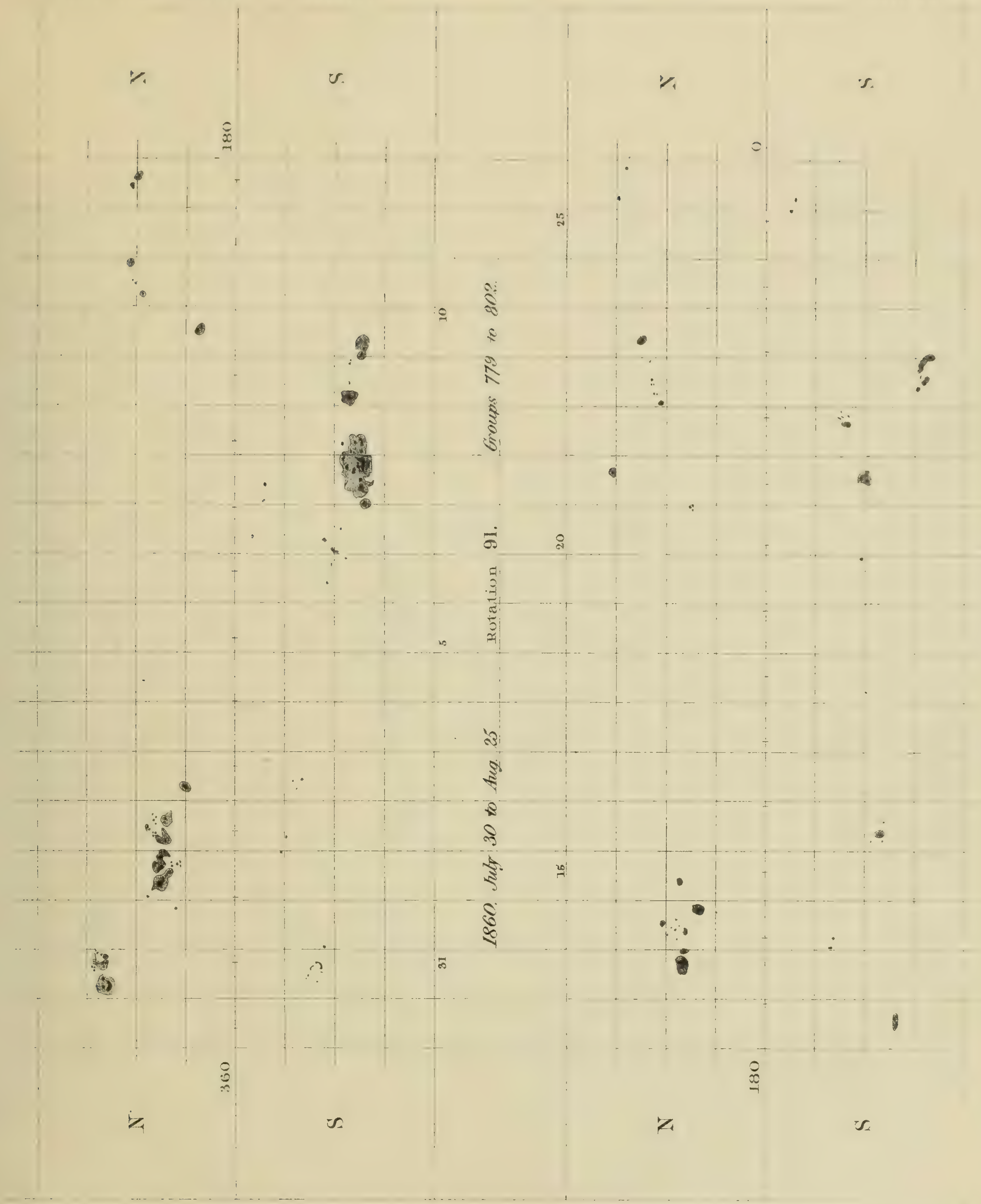


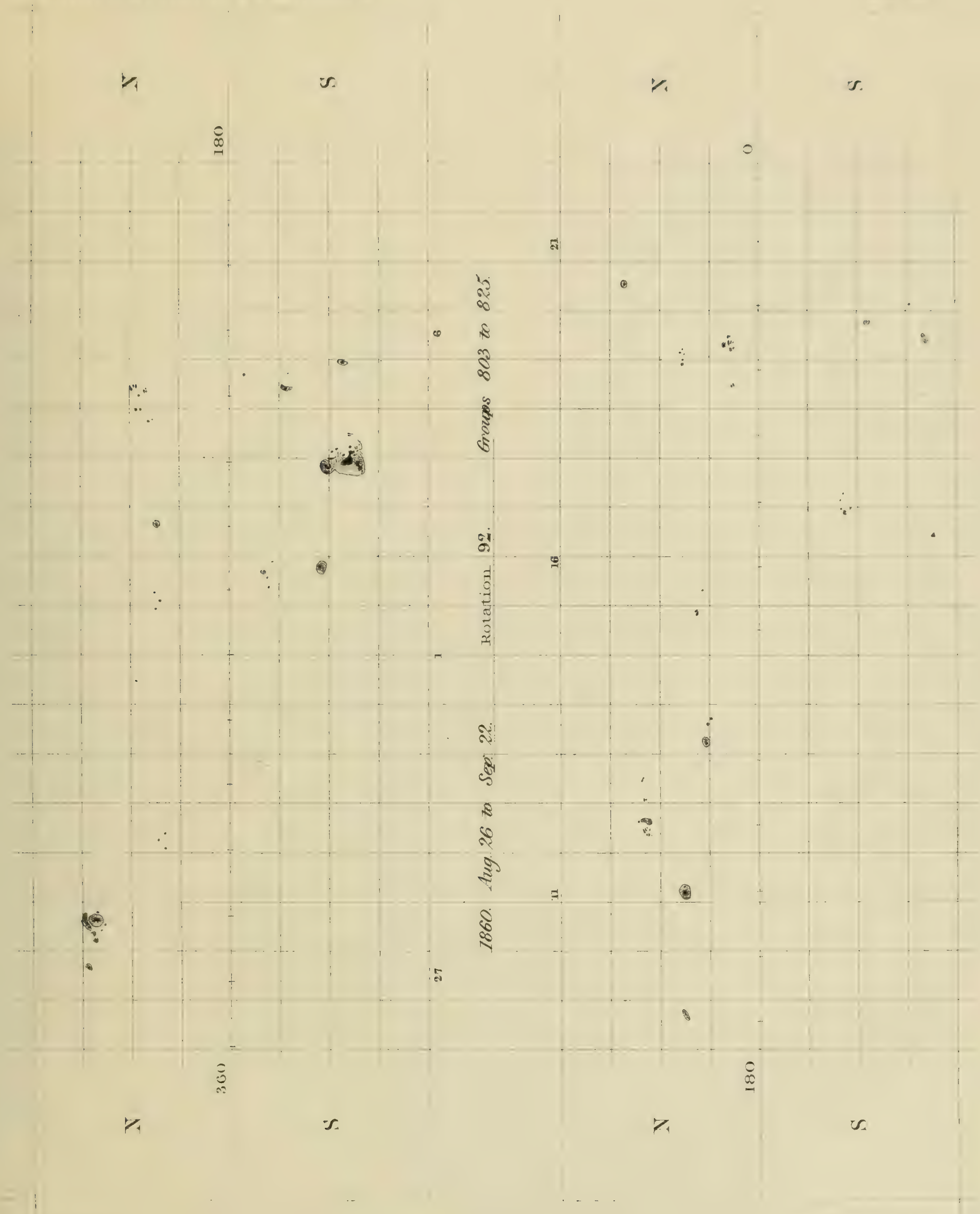
1860. May 9 to June 5. Rotation 88. *Groups 711 to 731.*

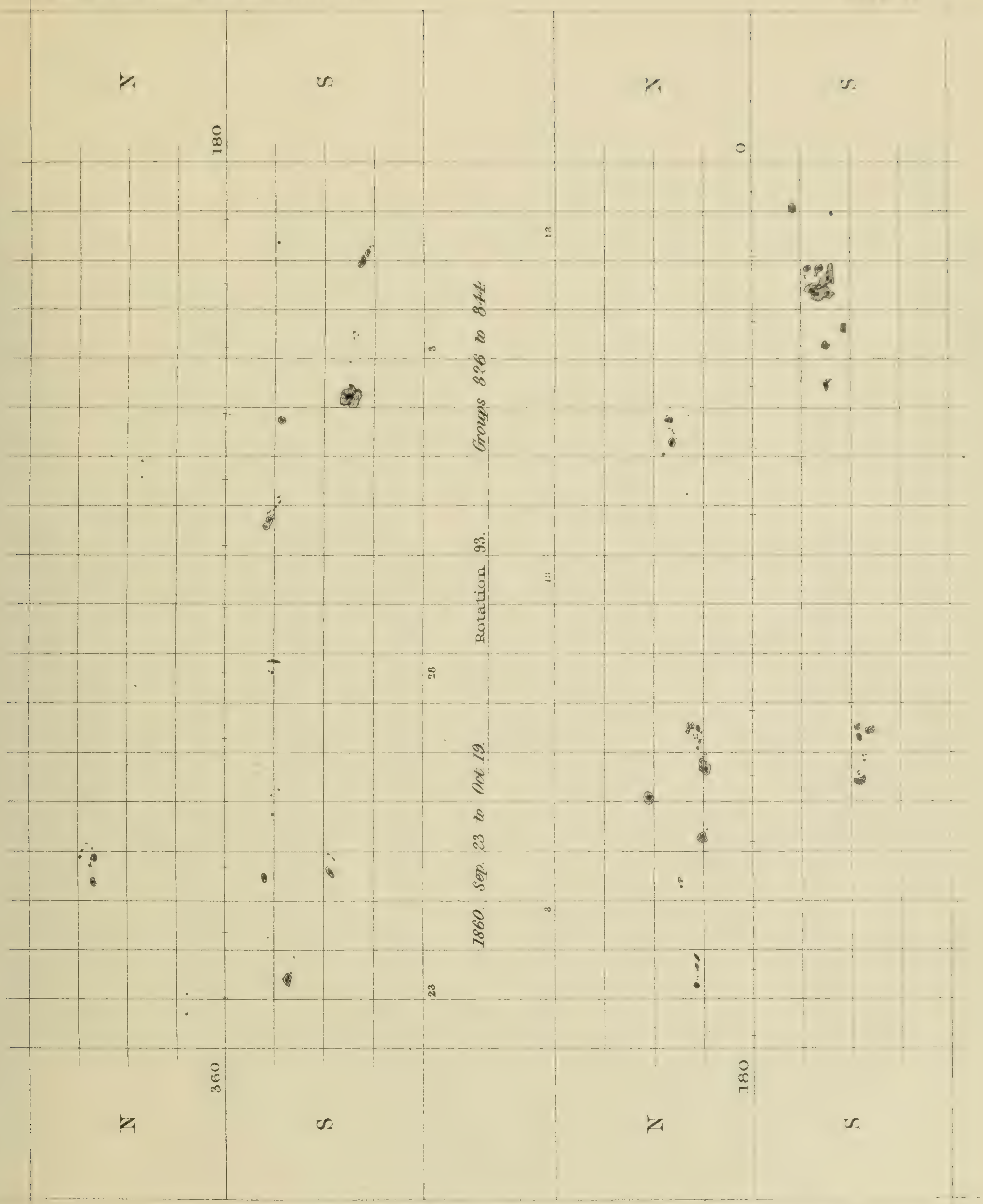


Fredk Dangerfield Lith.

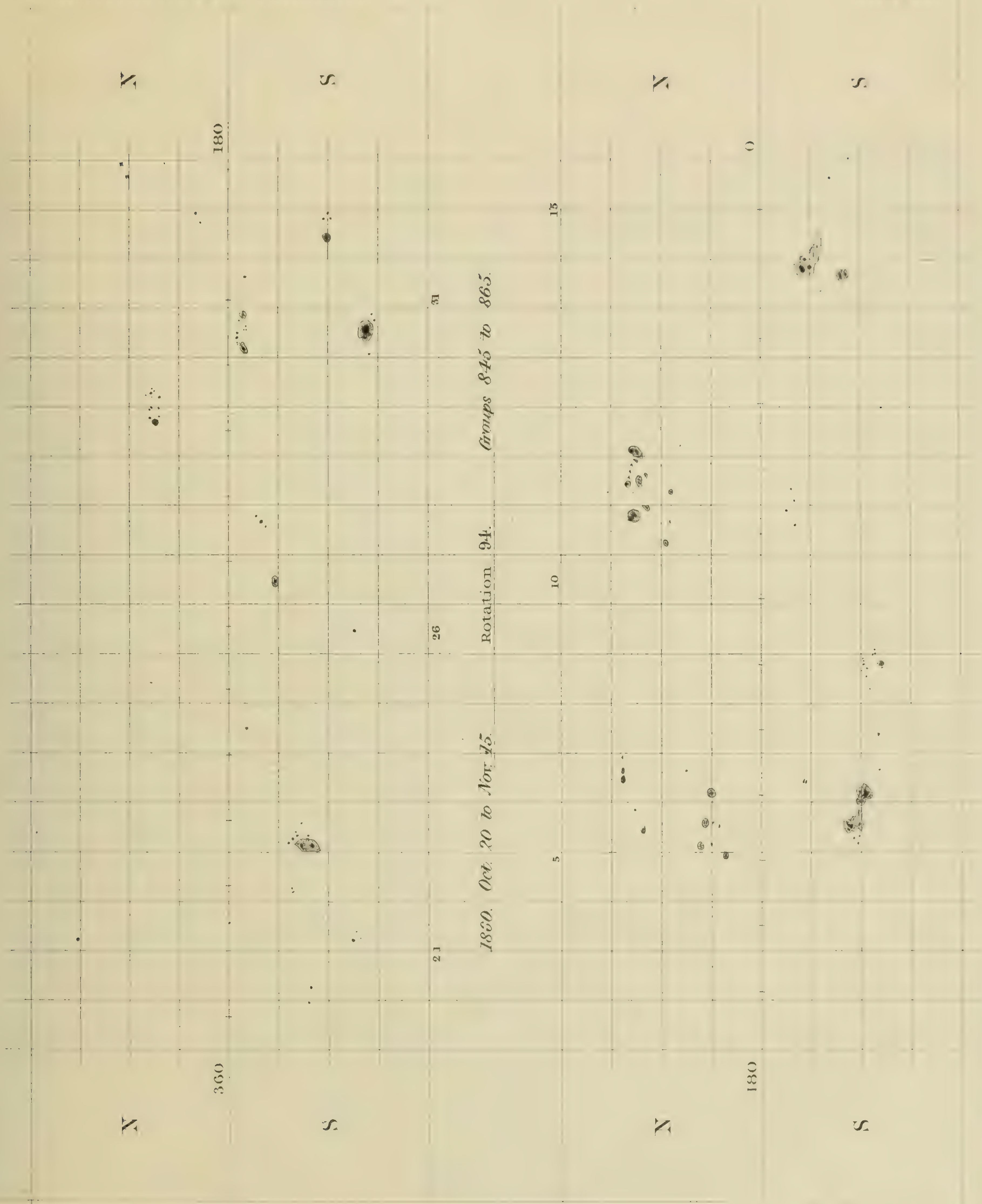

1860. July 3 to July 29. Rotation 90. Groups 754 to 778.
N
S
N
S
180
360
0
180
29
24
19
14
9
4


1860. July 30 to Aug. 25.
Rotation 91.
Groups 779 to 802.
N
S
N
S
180
360
0
180
31
5
10
15
20
25

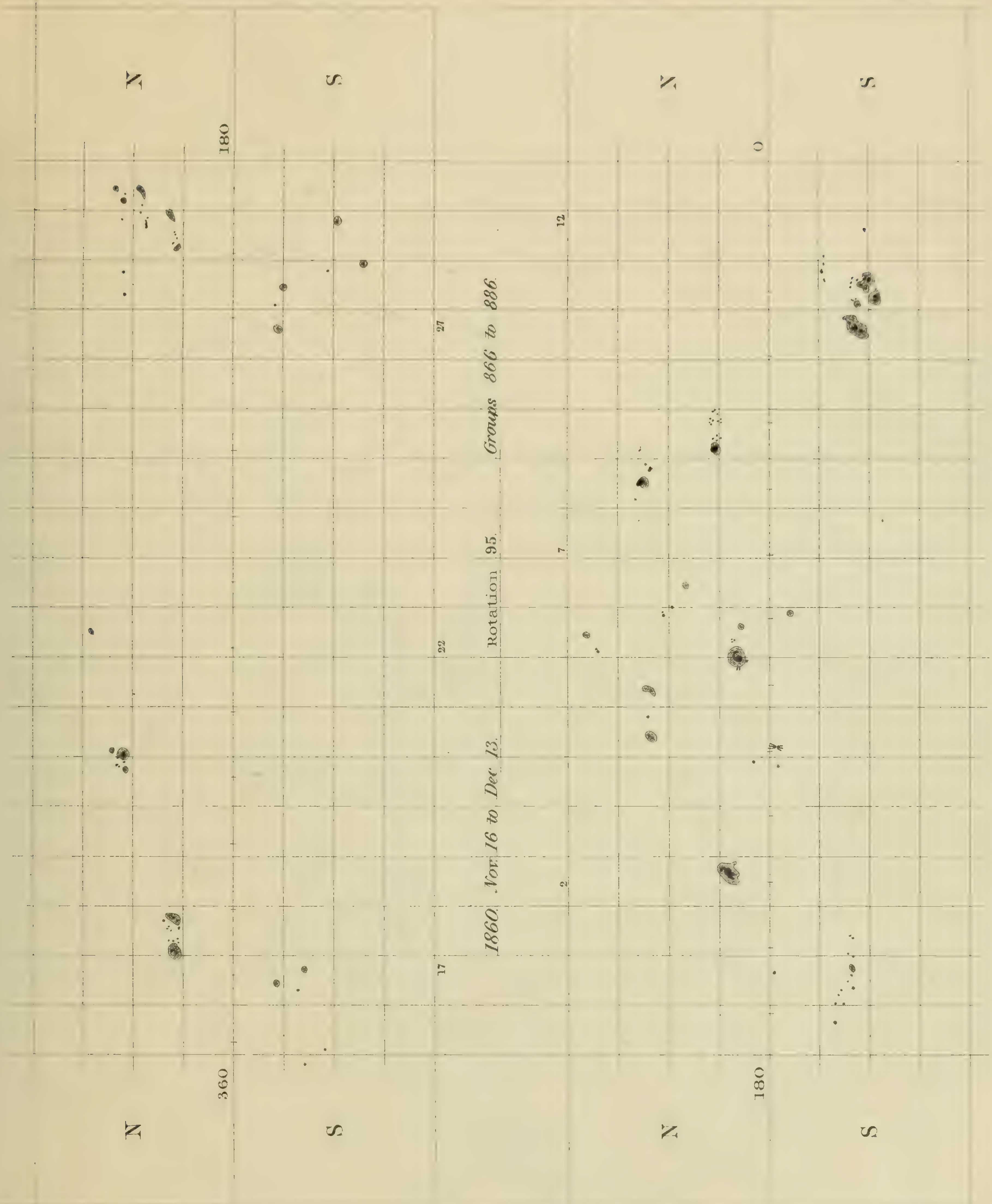

1860. Aug. 26 to Sep. 22. Rotation 92. Groups 803 to 825.
N
S
N
S
180
0
360
180
21
16
11
6
1
27


N
S
N
S
180
0
1860. Sep. 23 to Oct 19. Rotation 93. Groups 826 to 844.
360
180
N
S
N
S

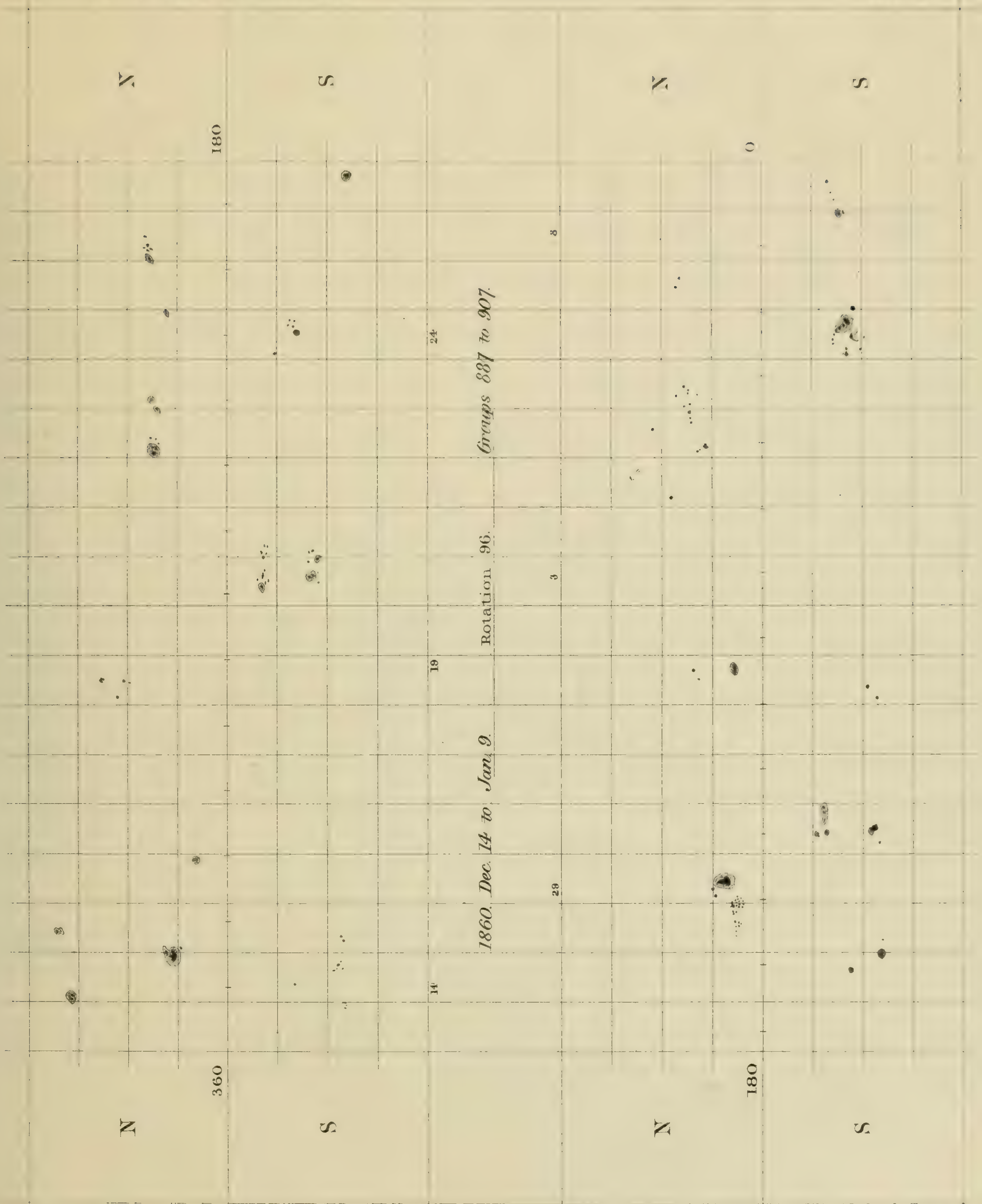
R C C Del.


1860. Oct. 20 to Nov. 15. Rotation 94. Groups 845 to 865.
N
S
180
360
0
15
10
5
31
26
21

R C C Del

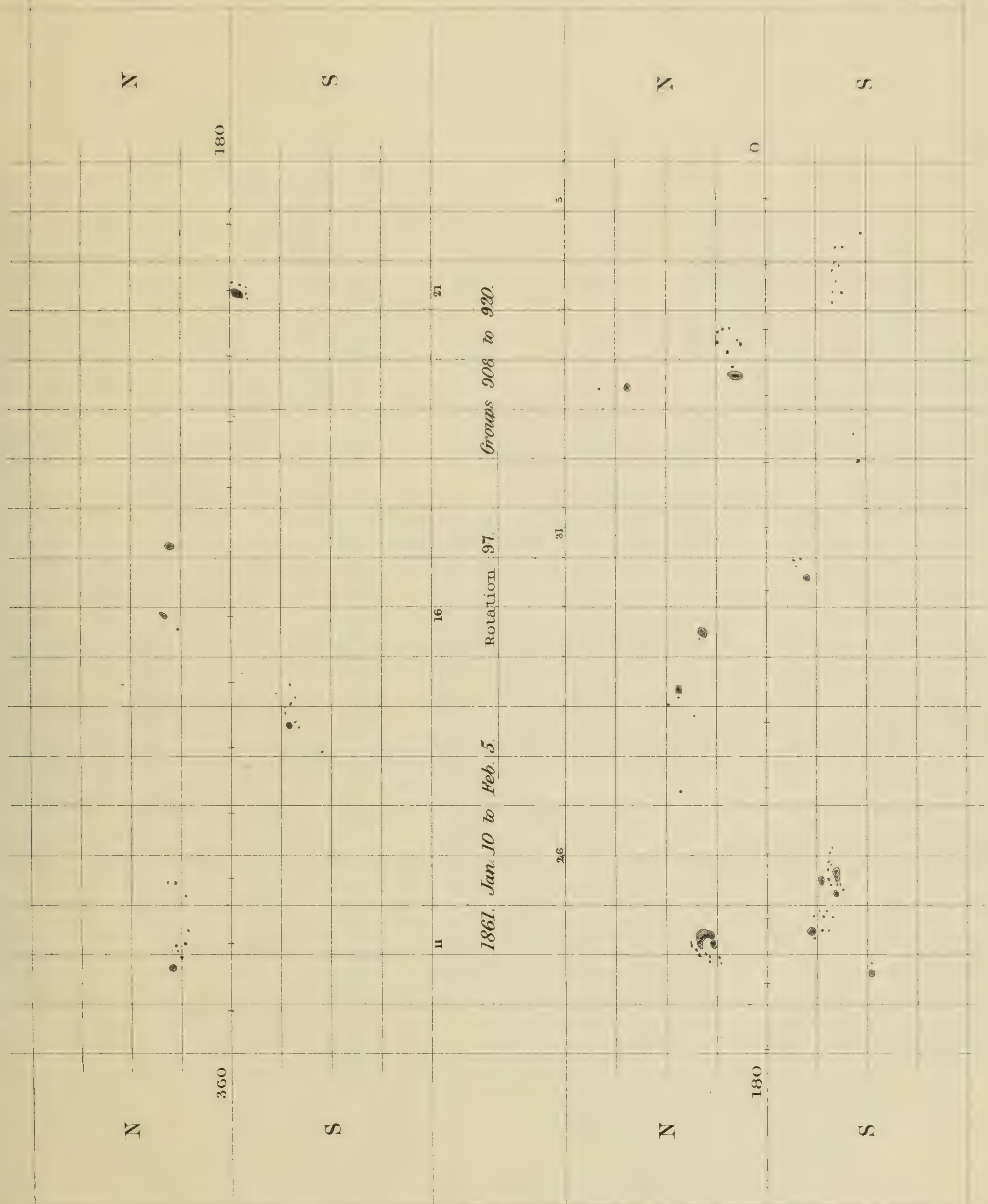


Fredk Dangerfield Lith

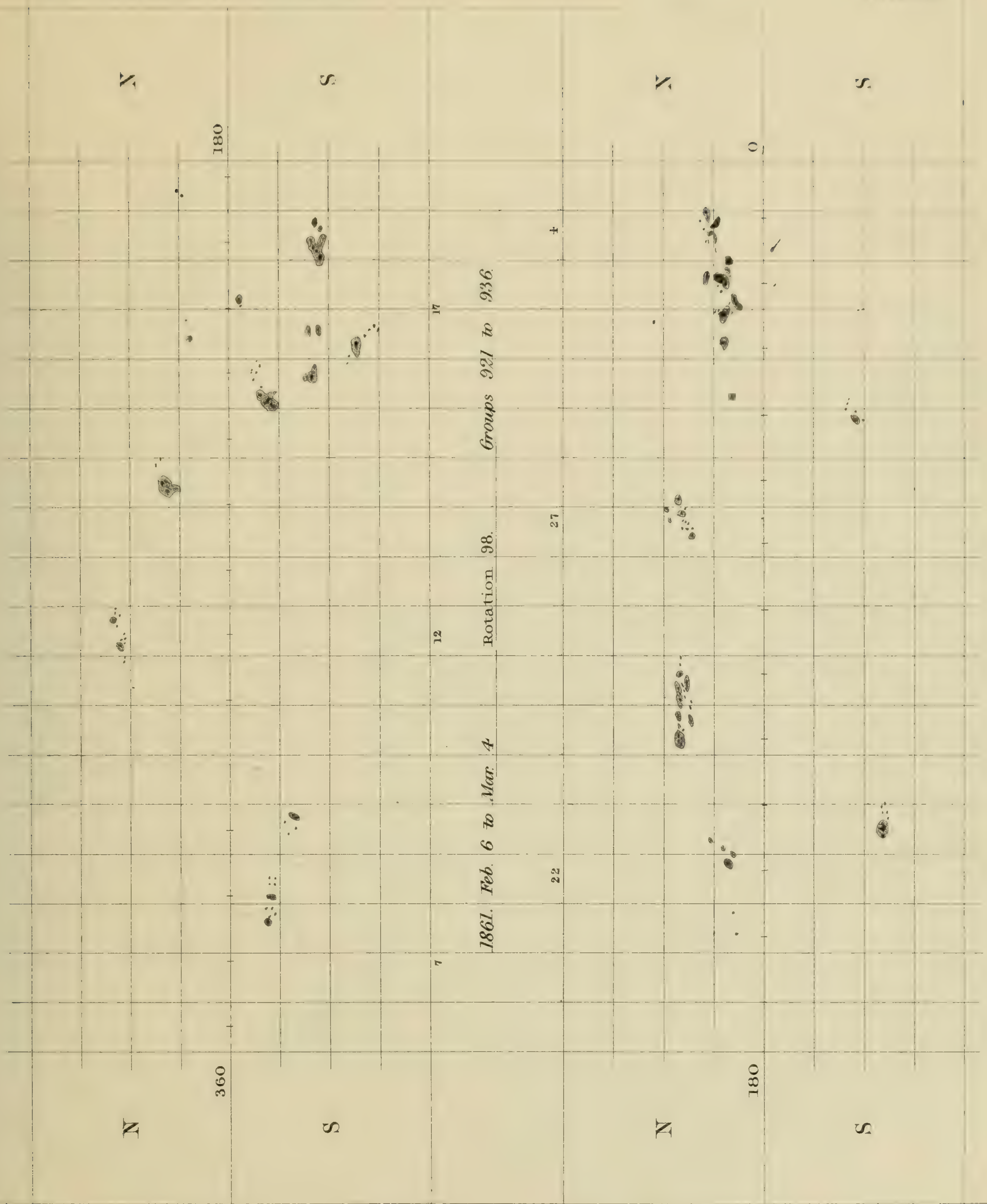


R C C del.

Fredk Dangerfield Lith.

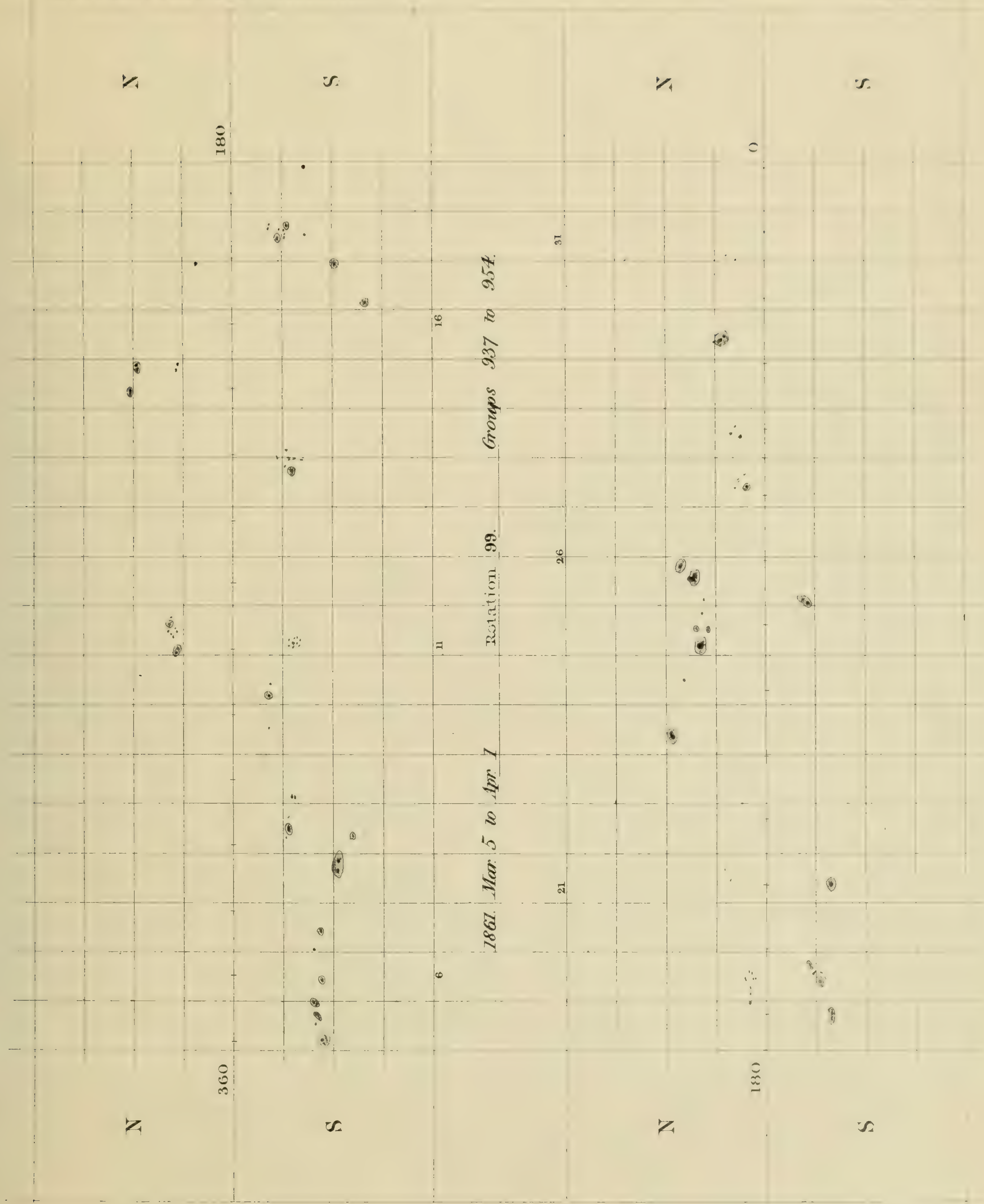


R. C. C. del.
Fred^k Dangerfield Lith.

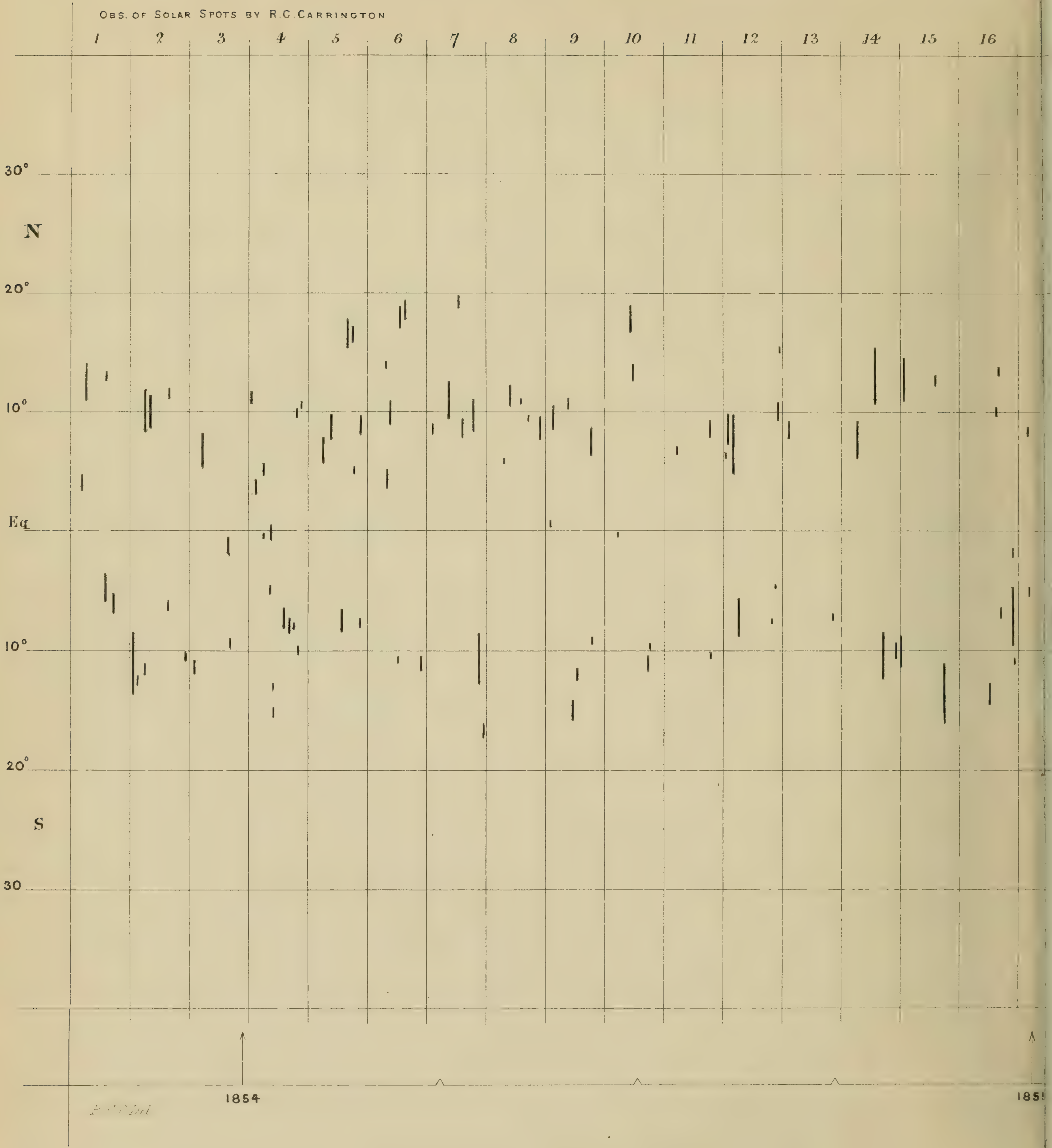


R. C. C. Del.

Fred Langerfield. Lith.

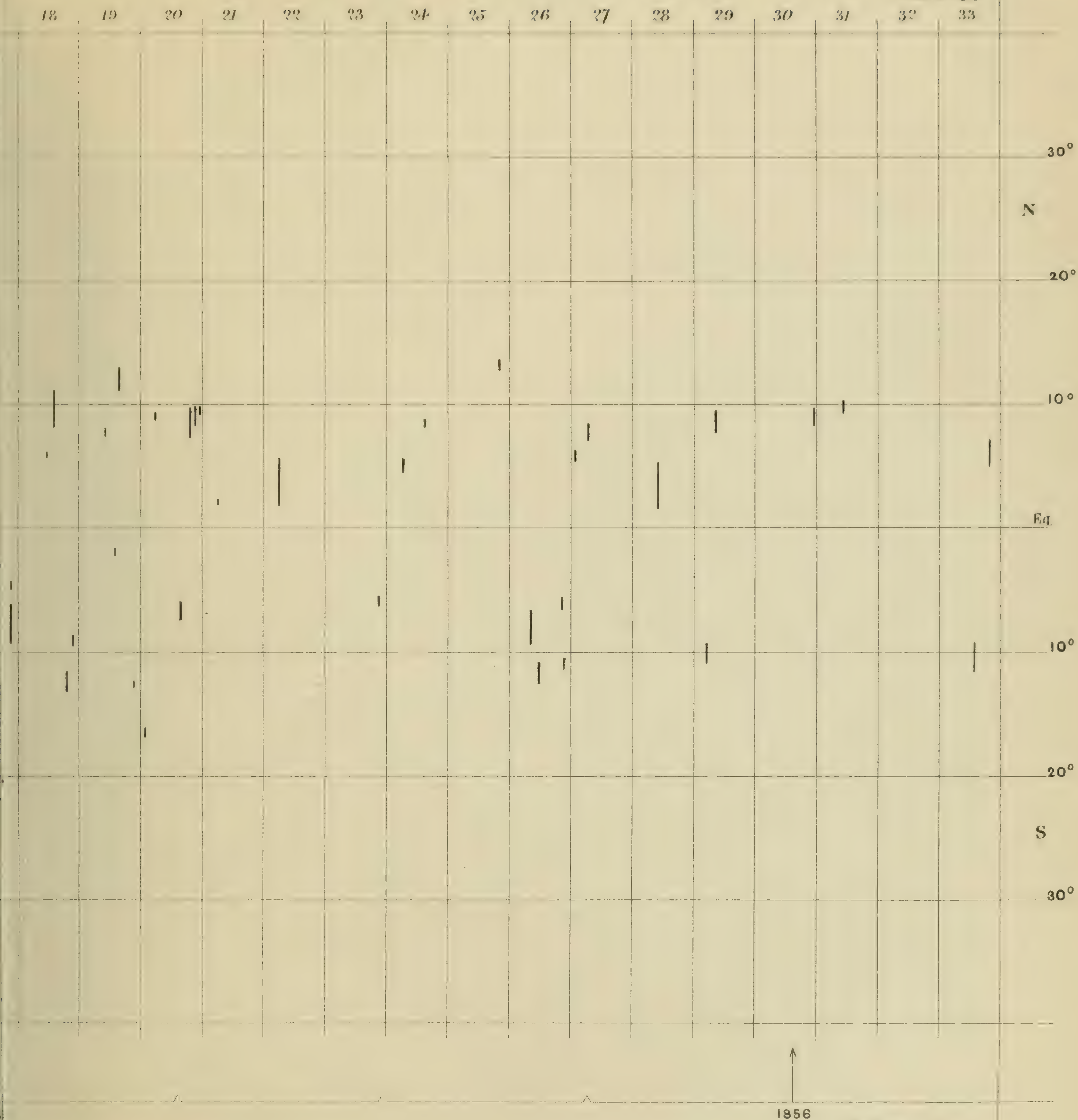

N
S
N
S
180
0
1861 Mar 5 to Apr 1 Rotation 99. Groups 937 to 954.
16
11
6
31
26
21
360
180
N
S
N
S

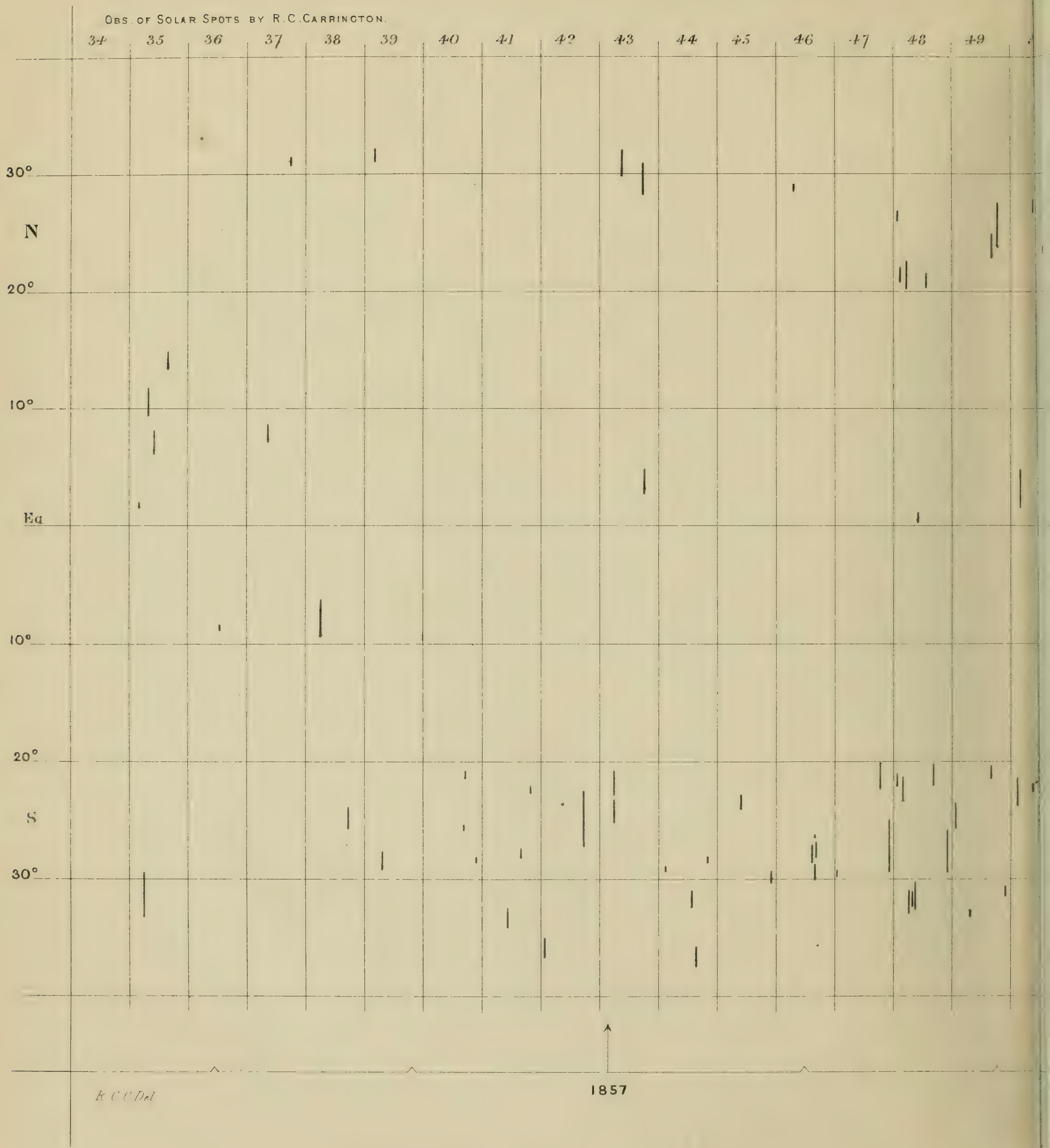
DISTRIBUTION OF THE SOLAR SPOT



IN HELIOGRAPHICAL LATITUDE. (I)

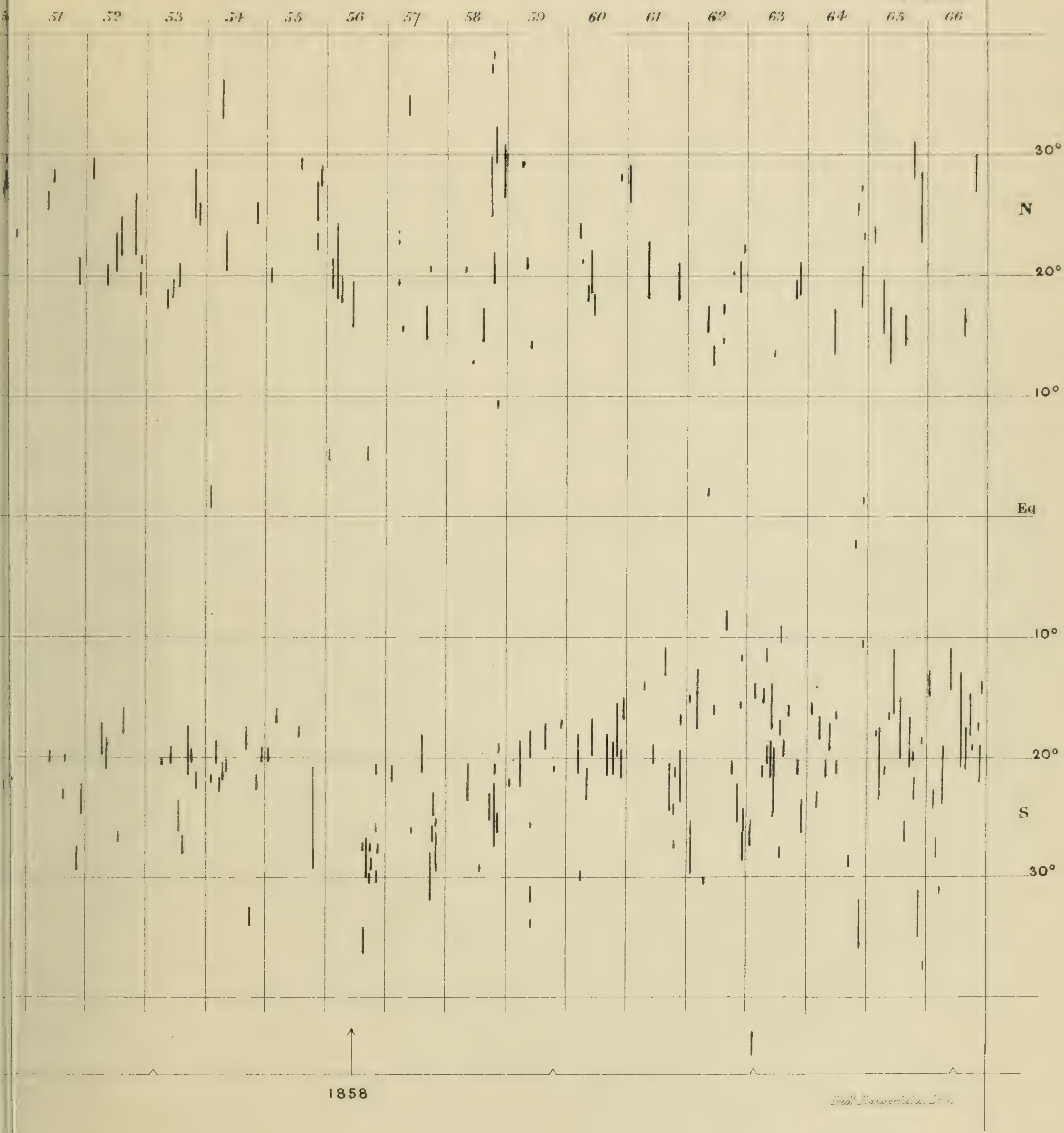
Plate 102



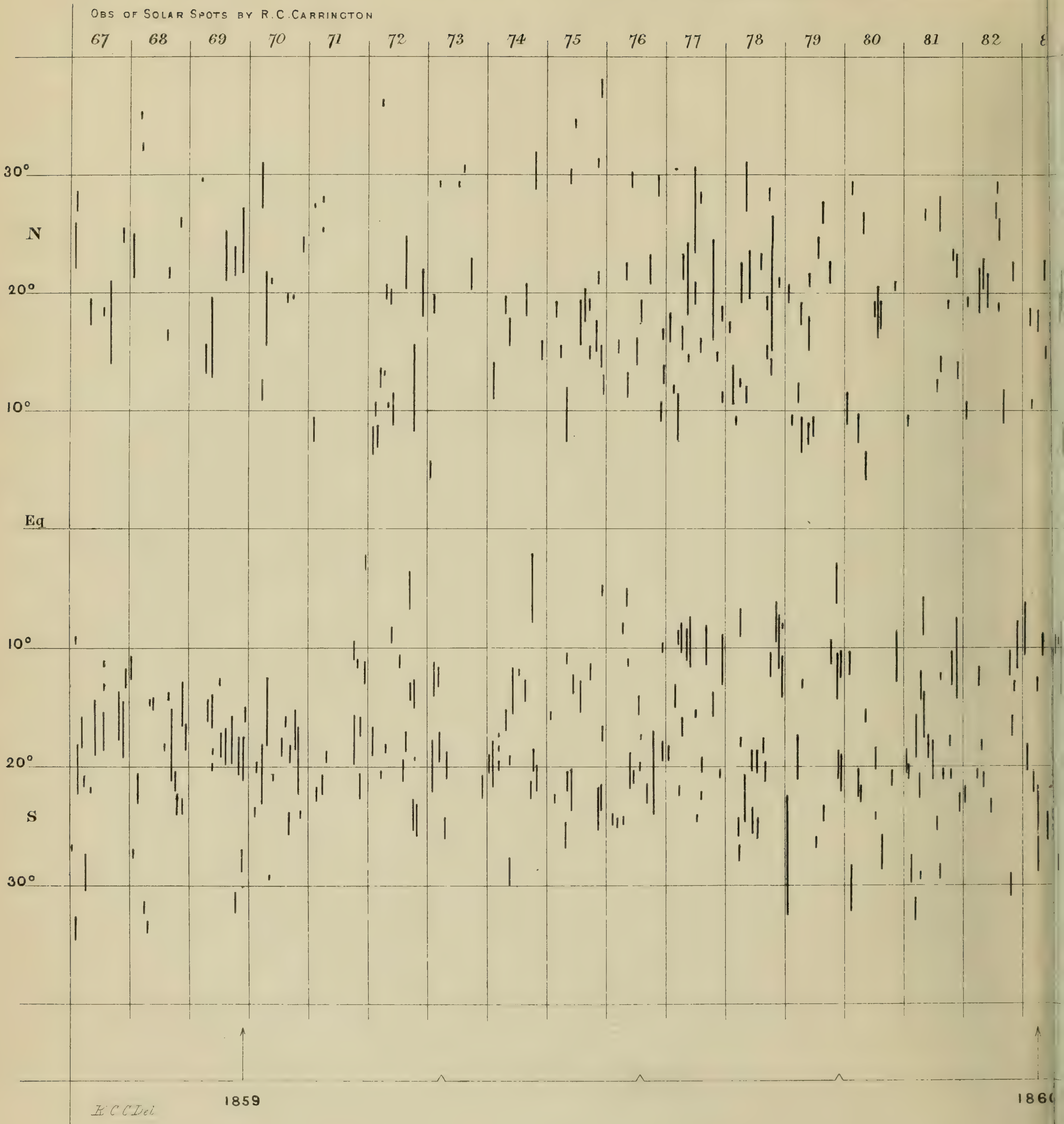

Obs. of Solar Spots by R.C.Carrington.
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
30°
N
20°
10°
Eq
10°
20°
S
30°
1857
R C C Del

N HELIOGRAPHICAL LATITUDE. (2)

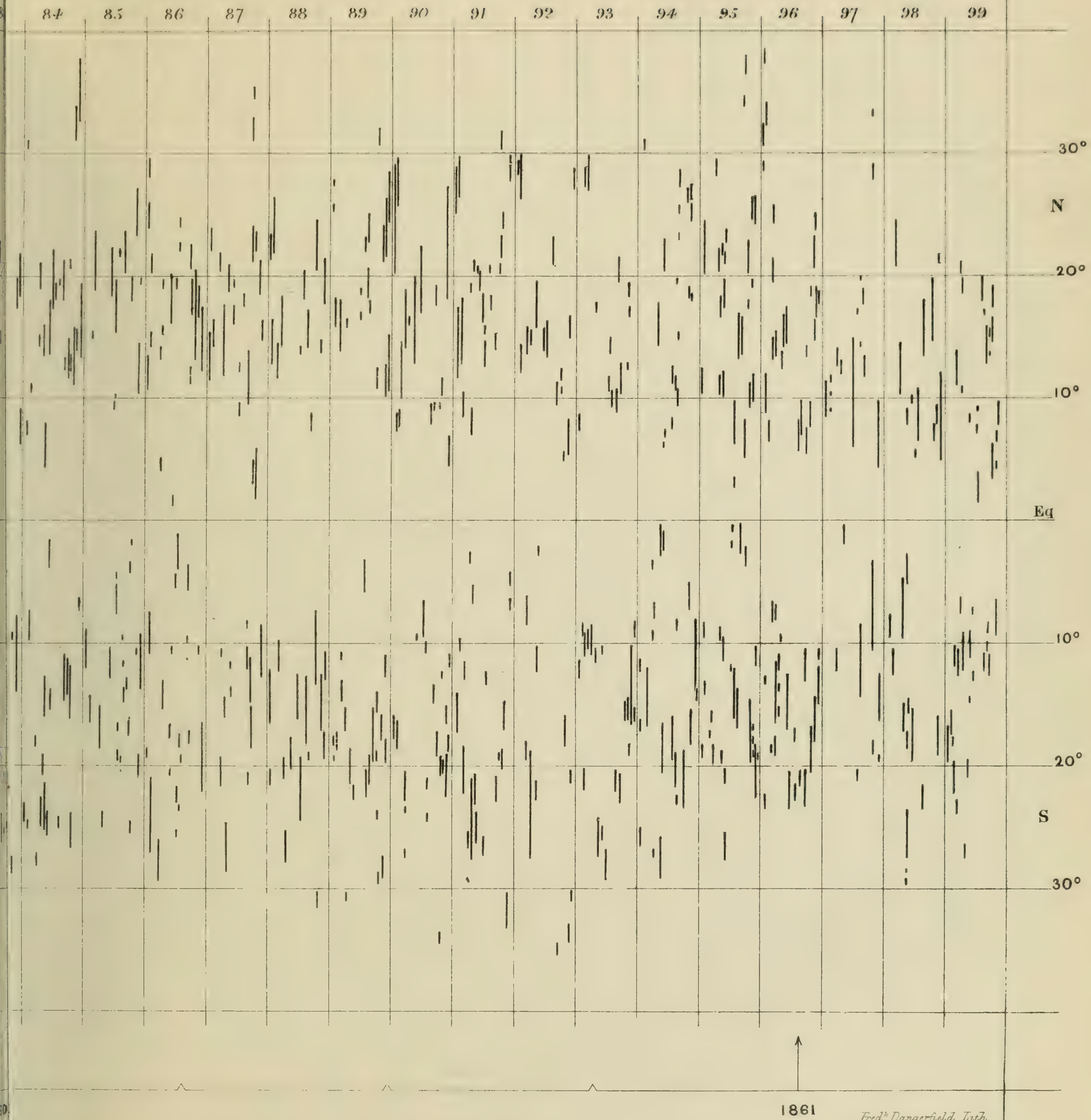
PLATE 102A



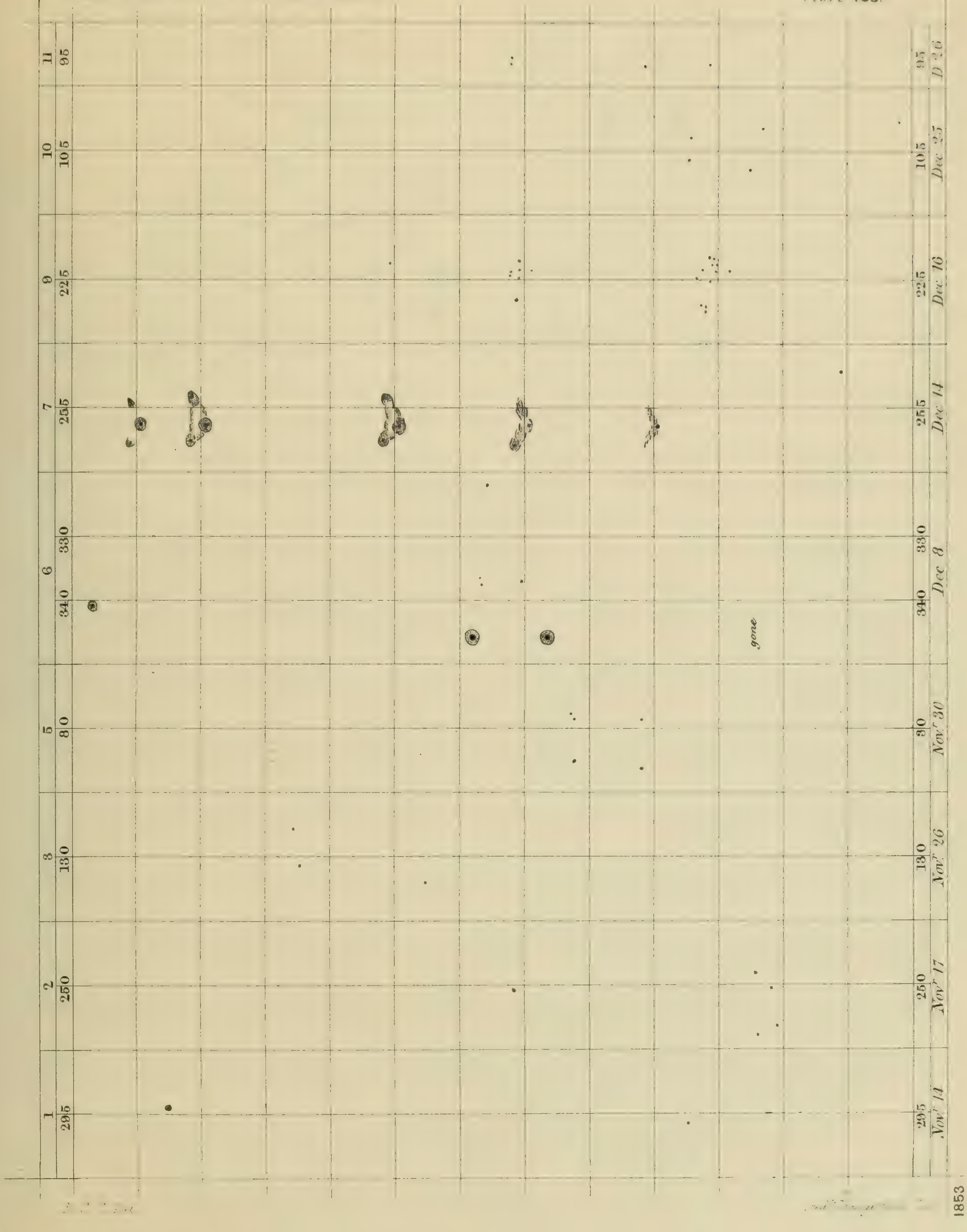
DISTRIBUTION OF THE SOLAR SPOTS IN

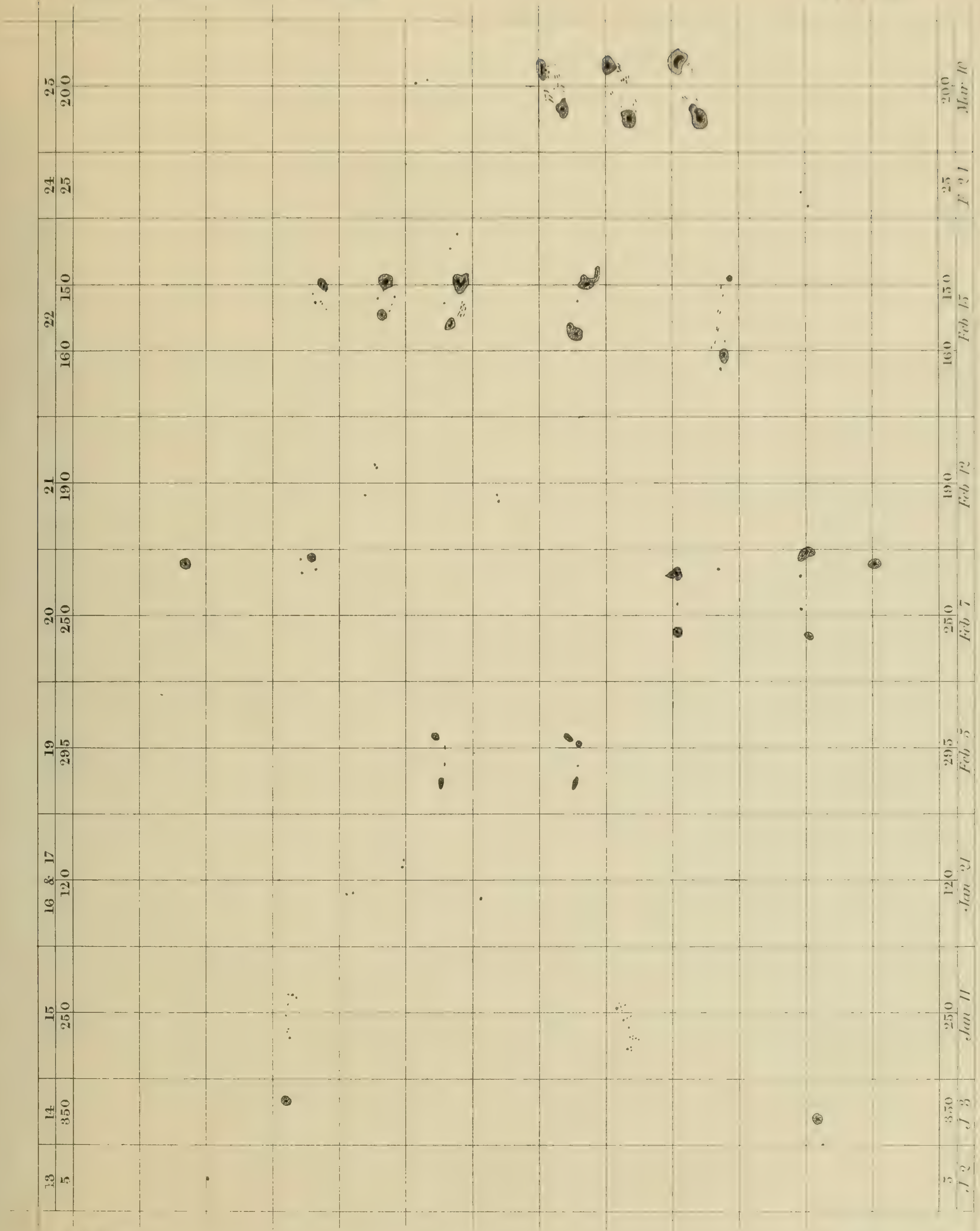


IN HELIOGRAPHICAL LATITUDE. (3)

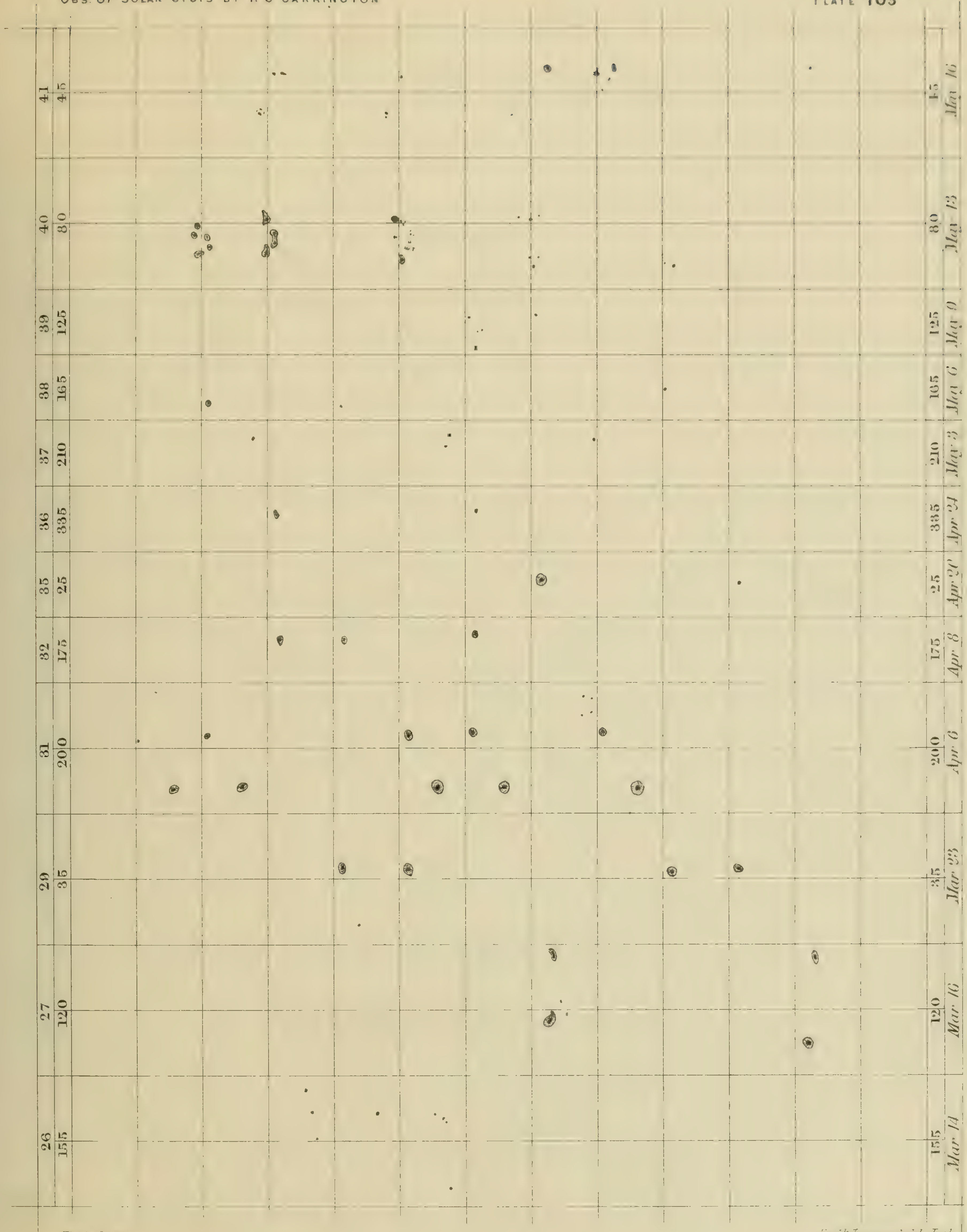


Fredk Dangerfield, Lith.


Nov^r 14
Nov^r 17
Nov^r 26
Nov^r 30
Dec 8
Dec 14
Dec 16
Dec 25
gone
1853


25
200
24
25
22
150
160
21
190
20
250
19
295
16 & 17
120
15
250
14
350
13
5
200
Mar 10
25
150
Feb 15
160
190
Feb 12
250
Feb 7
295
Feb 5
120
Jan 31
250
Jan 11
350
5

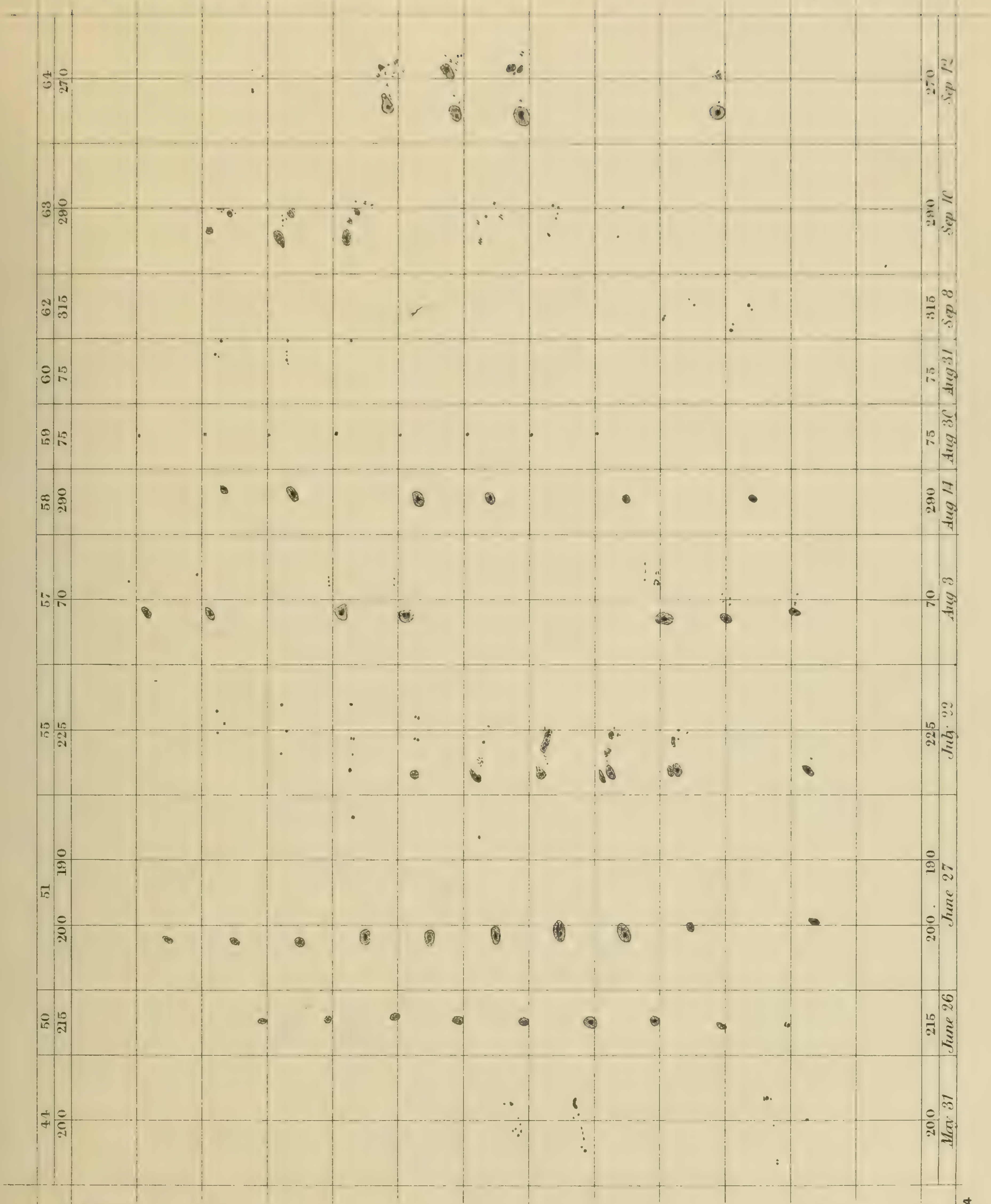
1854



R. C. Del

Fredk Dangerfield Lith

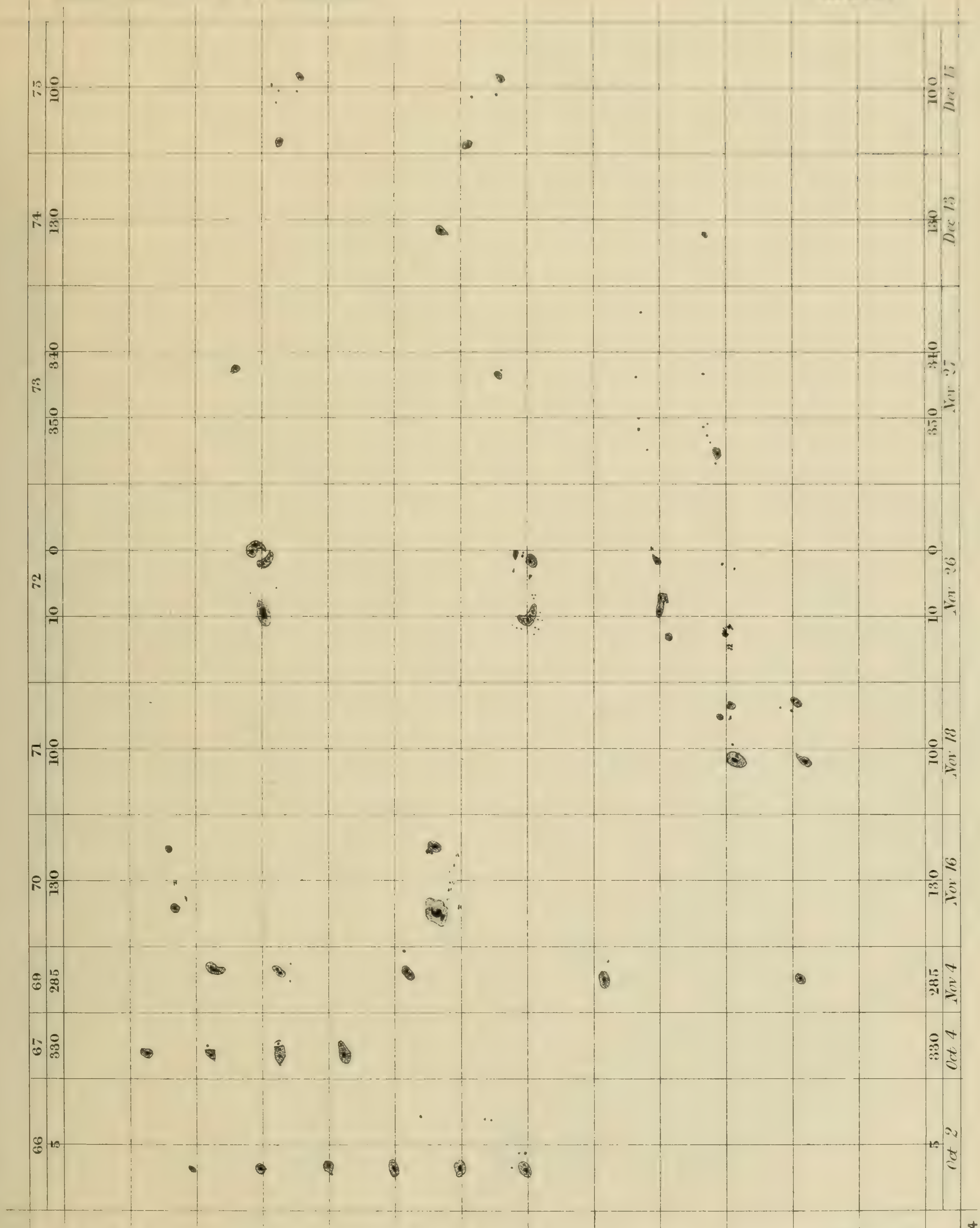
1854



R.C.C. Del.

Fredk Dangerfield Lith

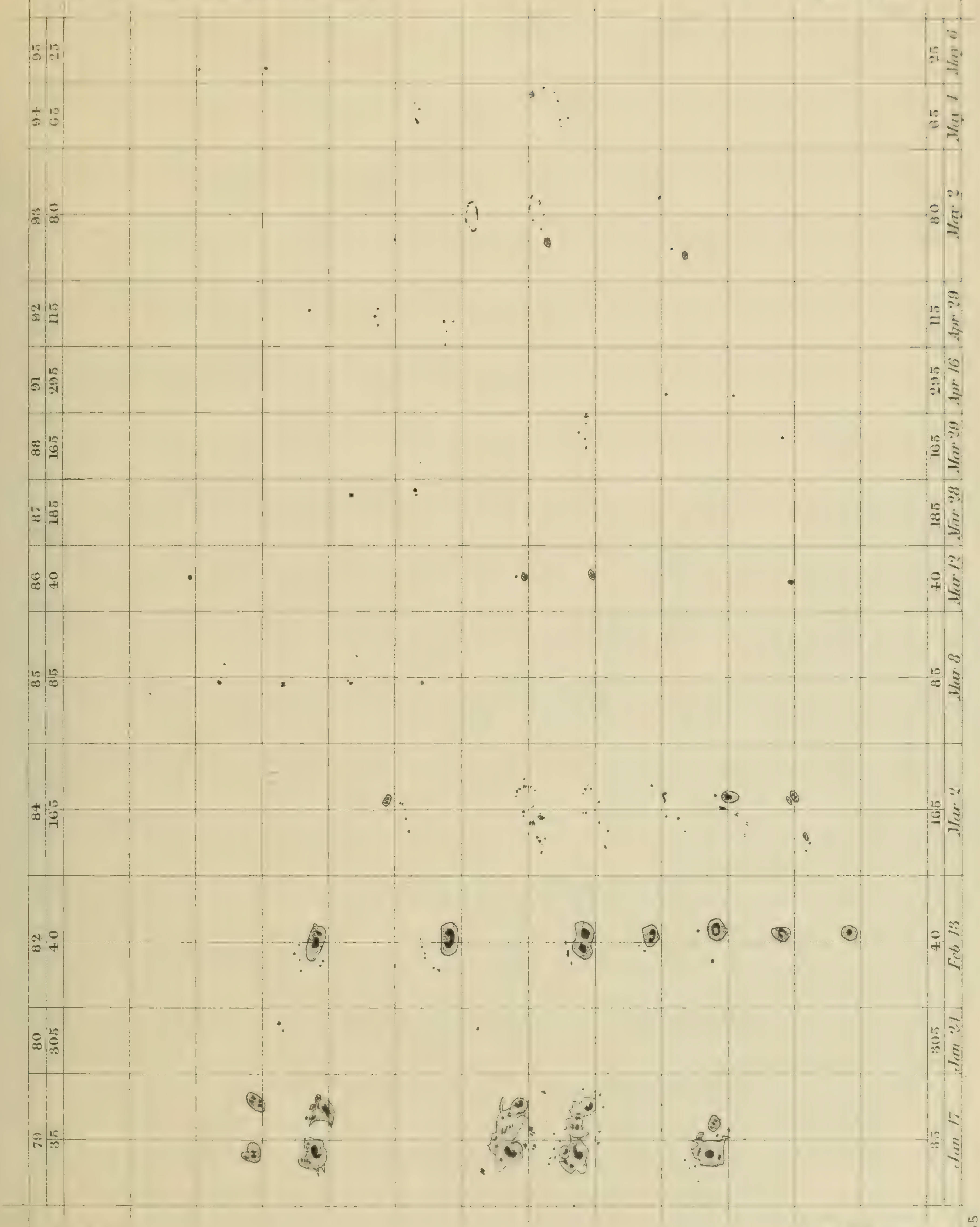
1854

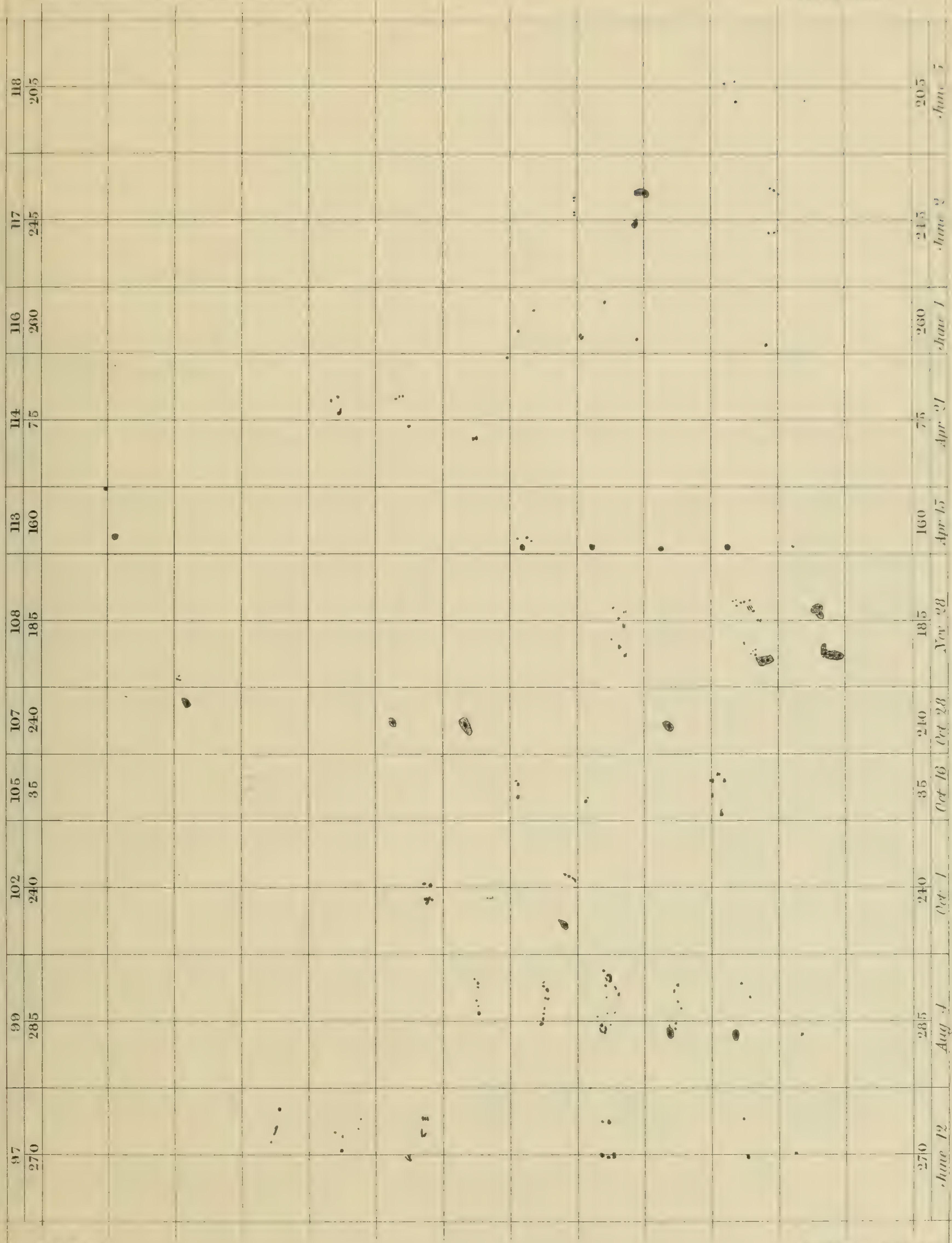


R. C. C. Del.

Fred^k Dangerfield Lith

1854

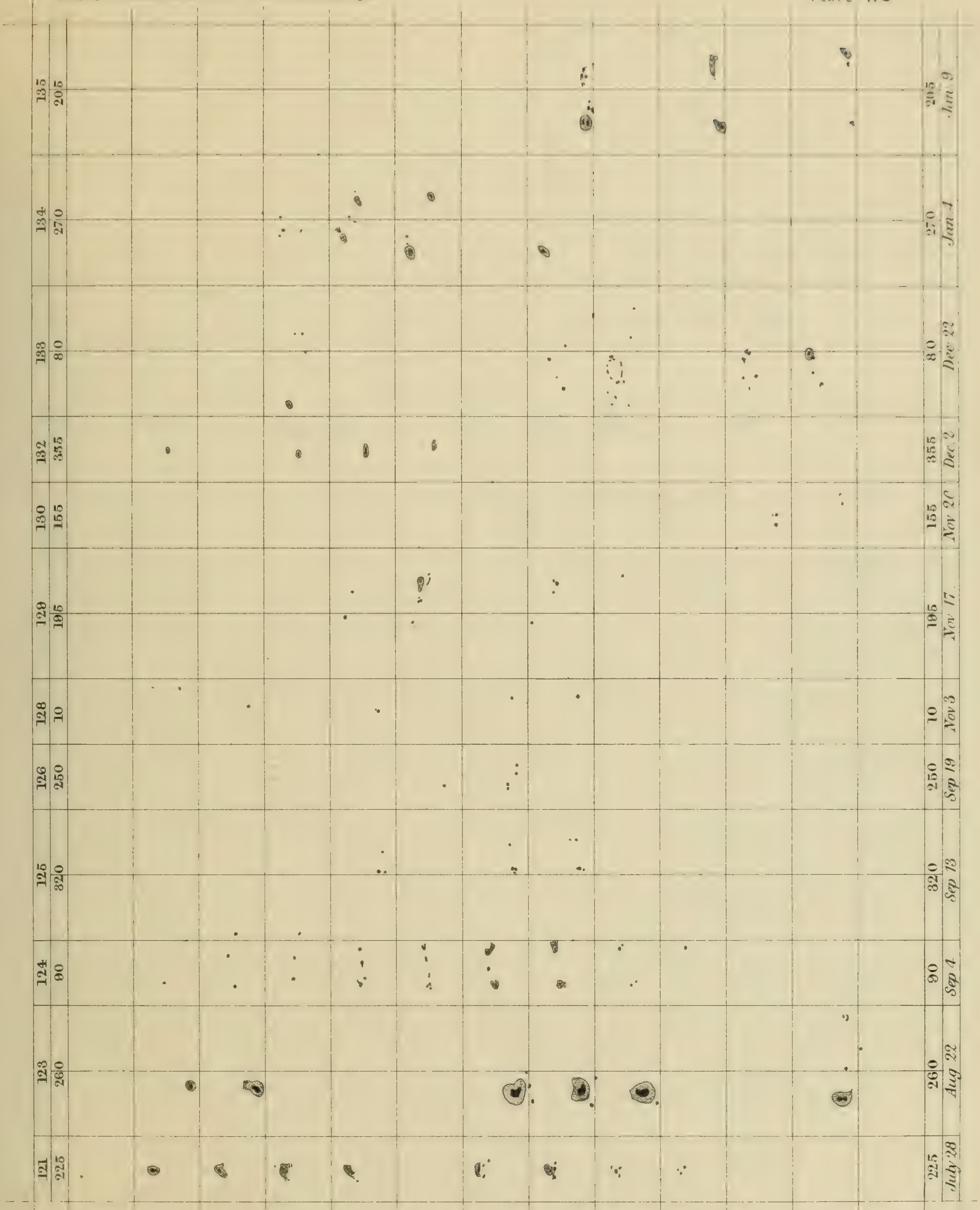

95 25 — 25 May 6
94 65 — 65 May 1
93 80 — 80 May 2
92 115 — 115 Apr 29
91 295 — 295 Apr 16
88 165 — 165 Mar 29
87 185 — 185 Mar 28
86 40 — 40 Mar 12
85 85 — 85 Mar 8
84 165 — 165 Mar 2
82 40 — 40 Feb 13
80 305 — 305 Jan 21
79 35 — 35 Jan 17
1855



R.C.C. del. Fred. Dangerfield lith.

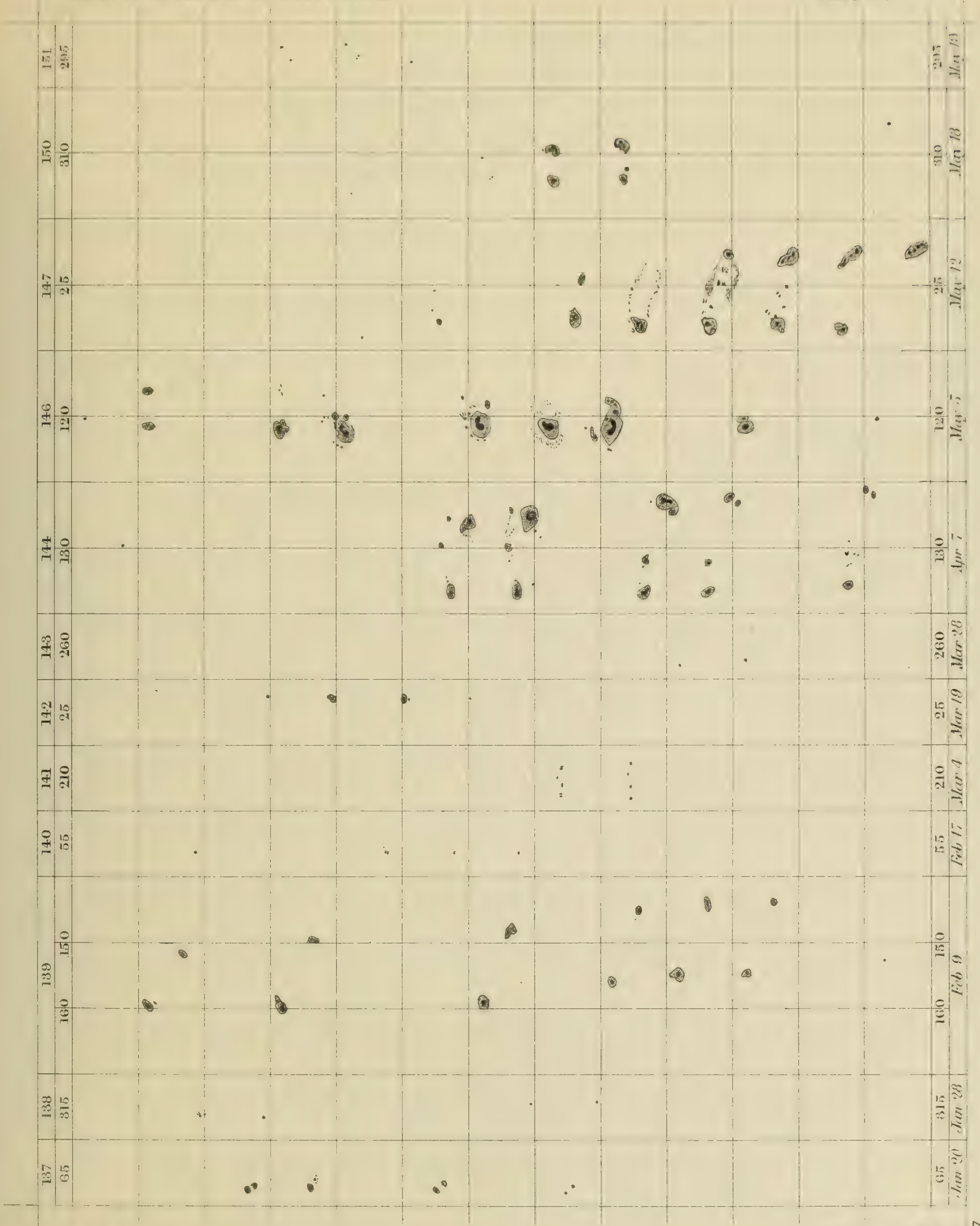
1855

Obs. of Solar Spots by R. C. Carrington. Plate 110

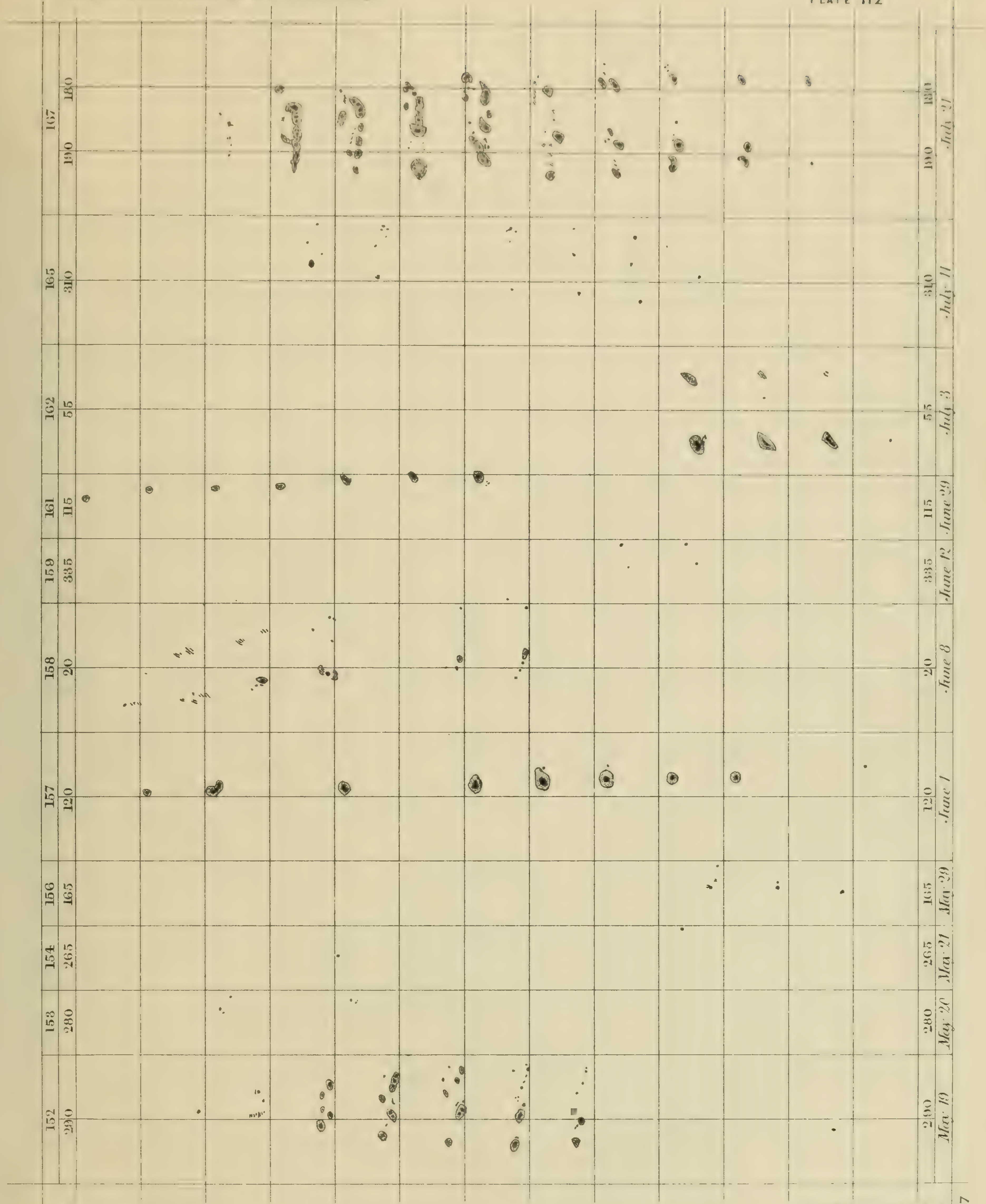


R. C. C. Del. Fredk Dangerfield Lith.

1855


151 295
150 310
147 25
146 120
144 130
143 260
142 25
141 210
140 55
139 150 160
138 315
137 65
Apr 7
Mar 28
Mar 19
Mar 4
Feb 17
Feb 9
Jan 28
Jan 20

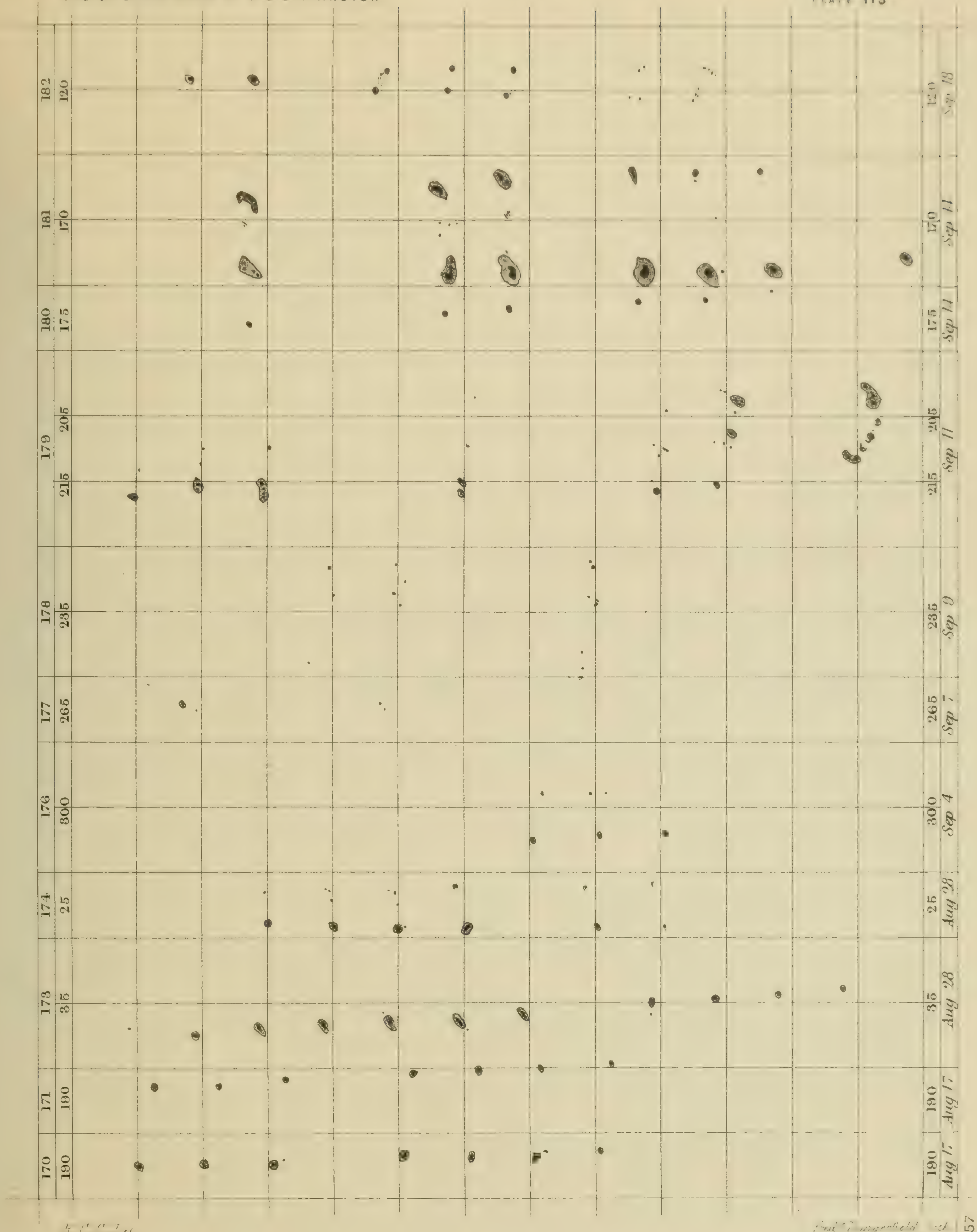
1857



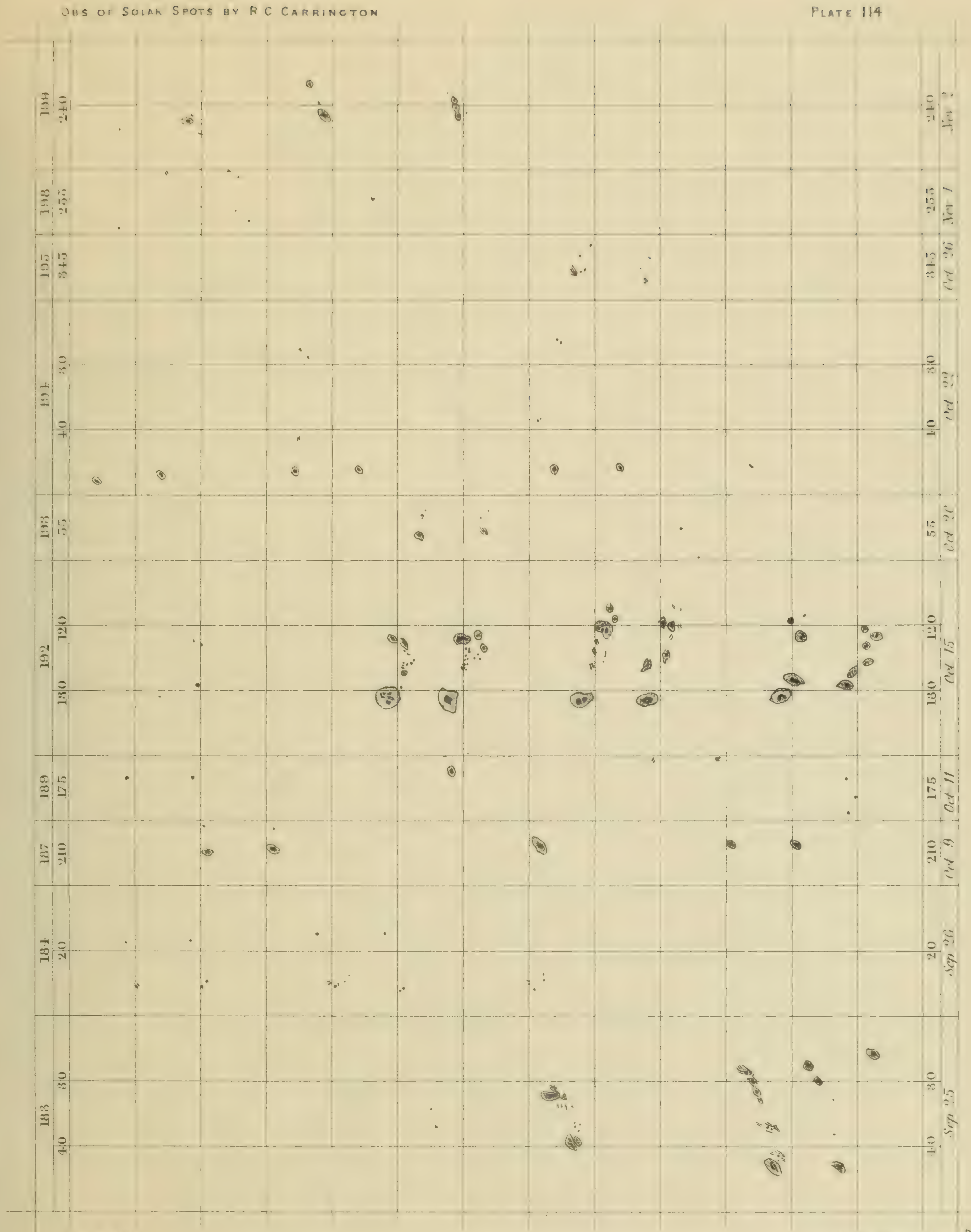
R. C. C. Del.

Fredk Dangerfield Lith

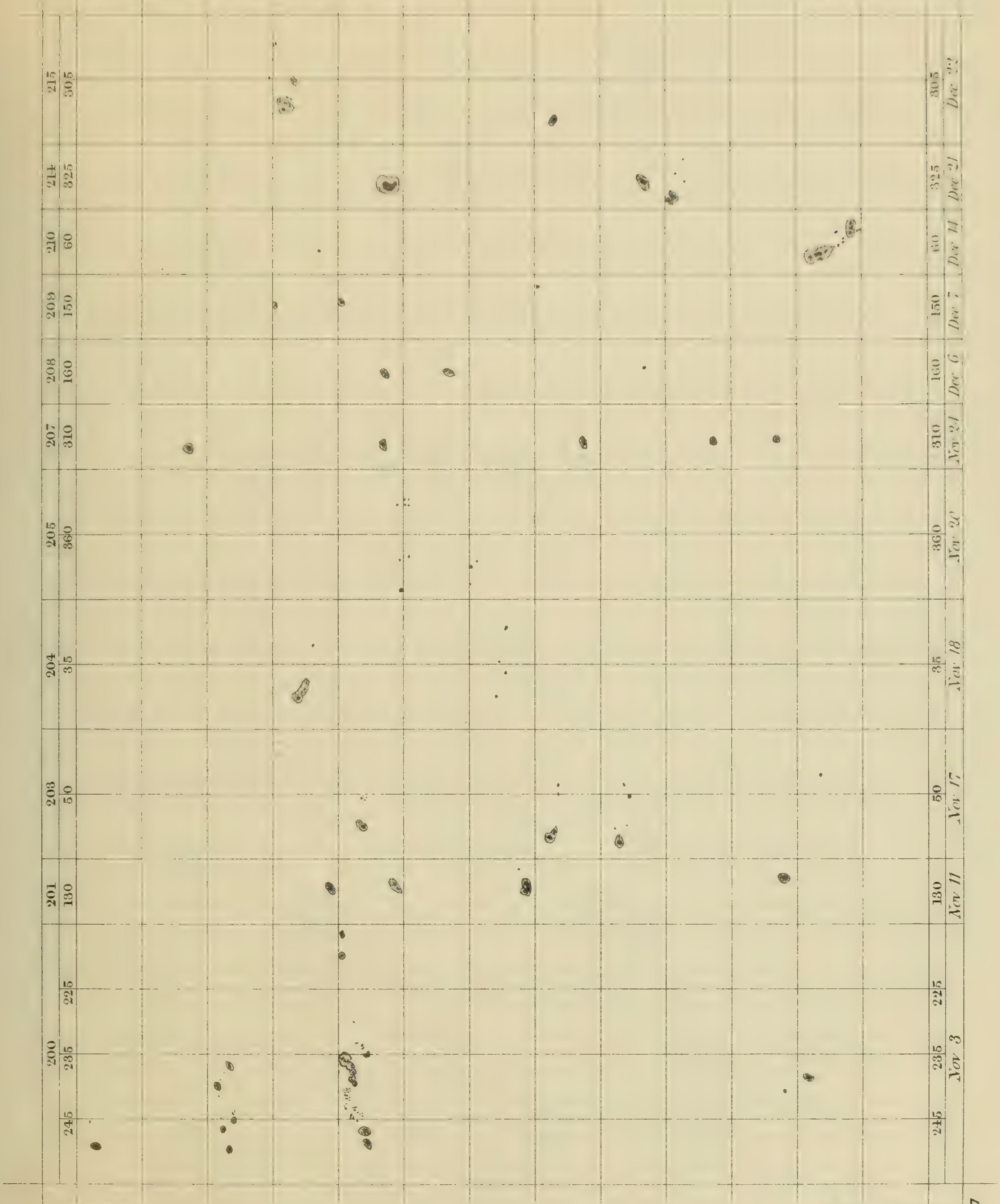
1857


182 120
181 170
180 175
179 205 215
178 235
177 265
176 300
174 25
173 35
171 190
170 190
120 Sep 18
170 Sep 11
175 Sep 11
205 215 Sep 11
235 Sep 9
265 Sep 7
300 Sep 4
25 Aug 28
35 Aug 28
190 Aug 17
190 Aug 17

1857


199 240
198 255
195 345
194 30 40
193 55
192 120 130
189 175
187 210
184 20
183 30 40
Nov 2
Nov 1
Oct 26
Oct 22
Oct 20
Oct 15
Oct 11
Oct 9
Sep 26
Sep 25

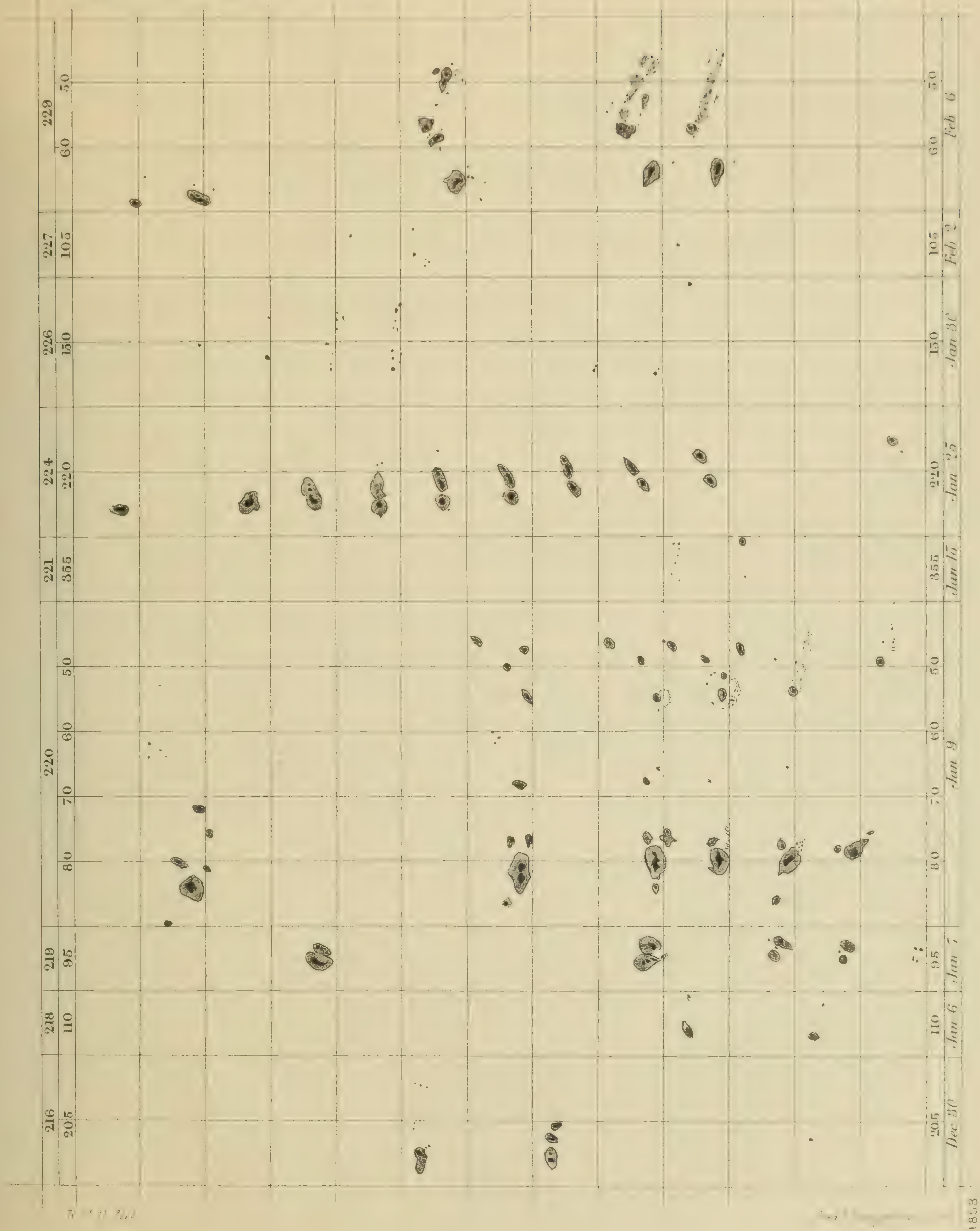
1857

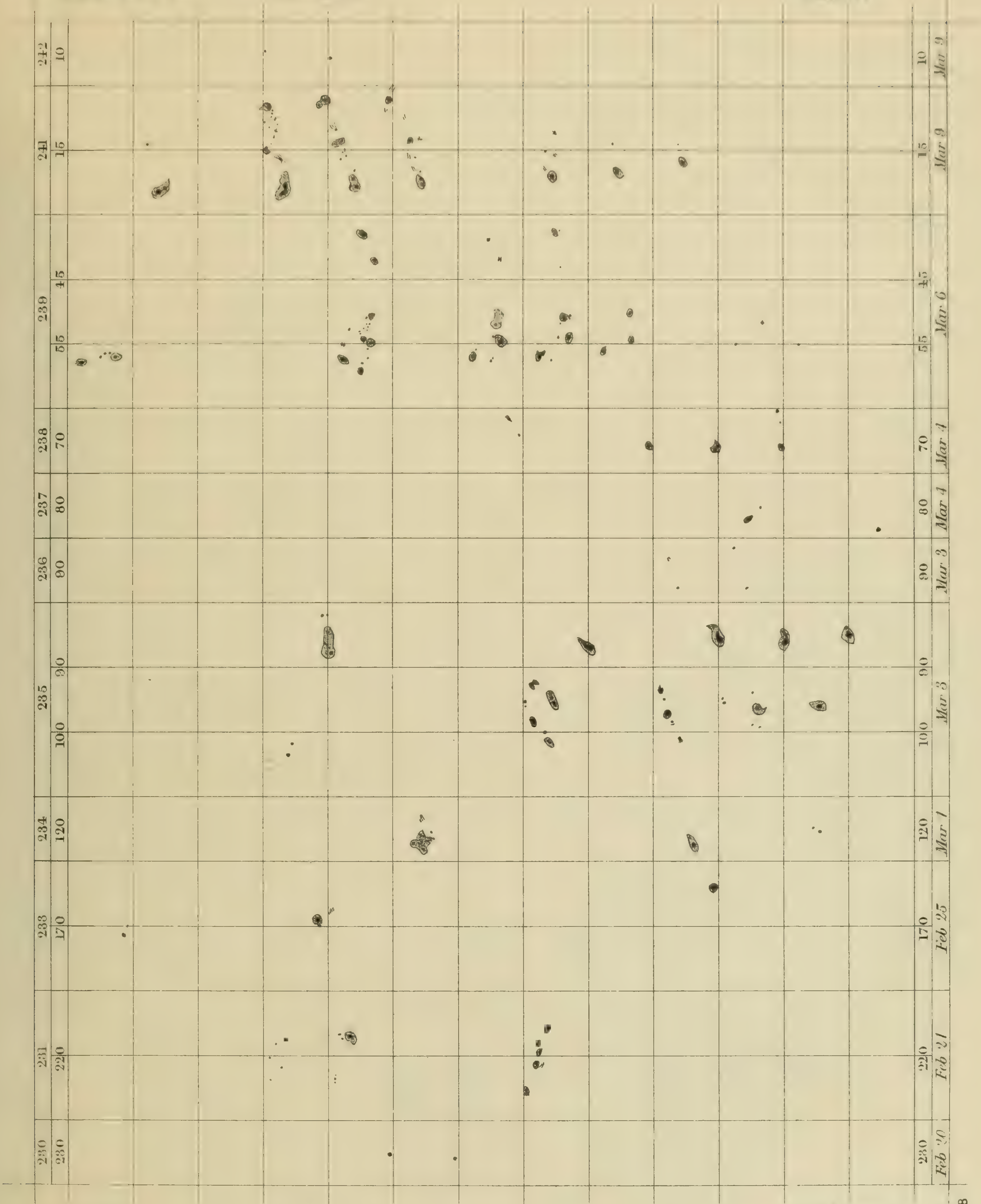


Fredk Dangerfield lith

1857

Obs. of Solar Spots by R. C. Carrington Plate 116

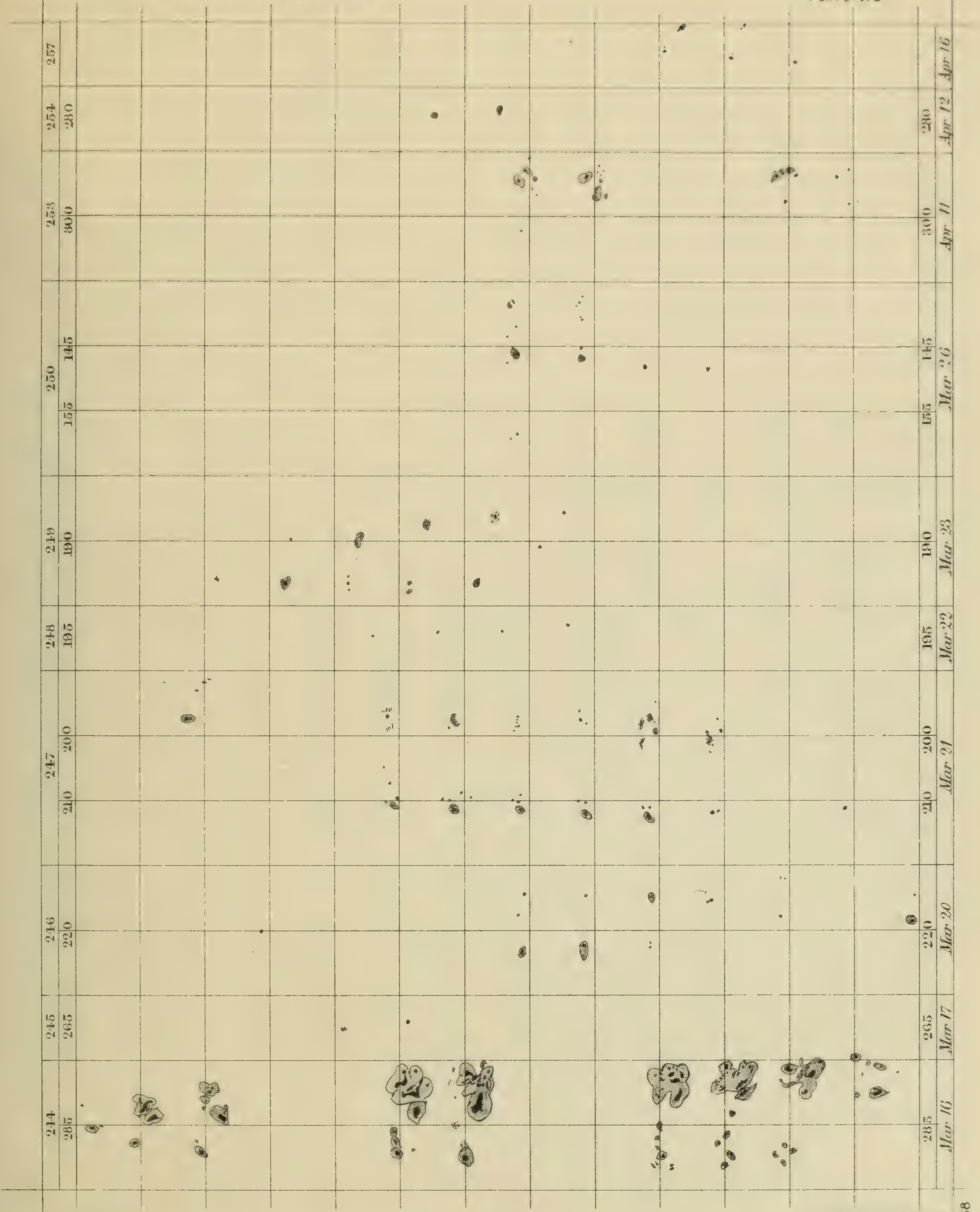




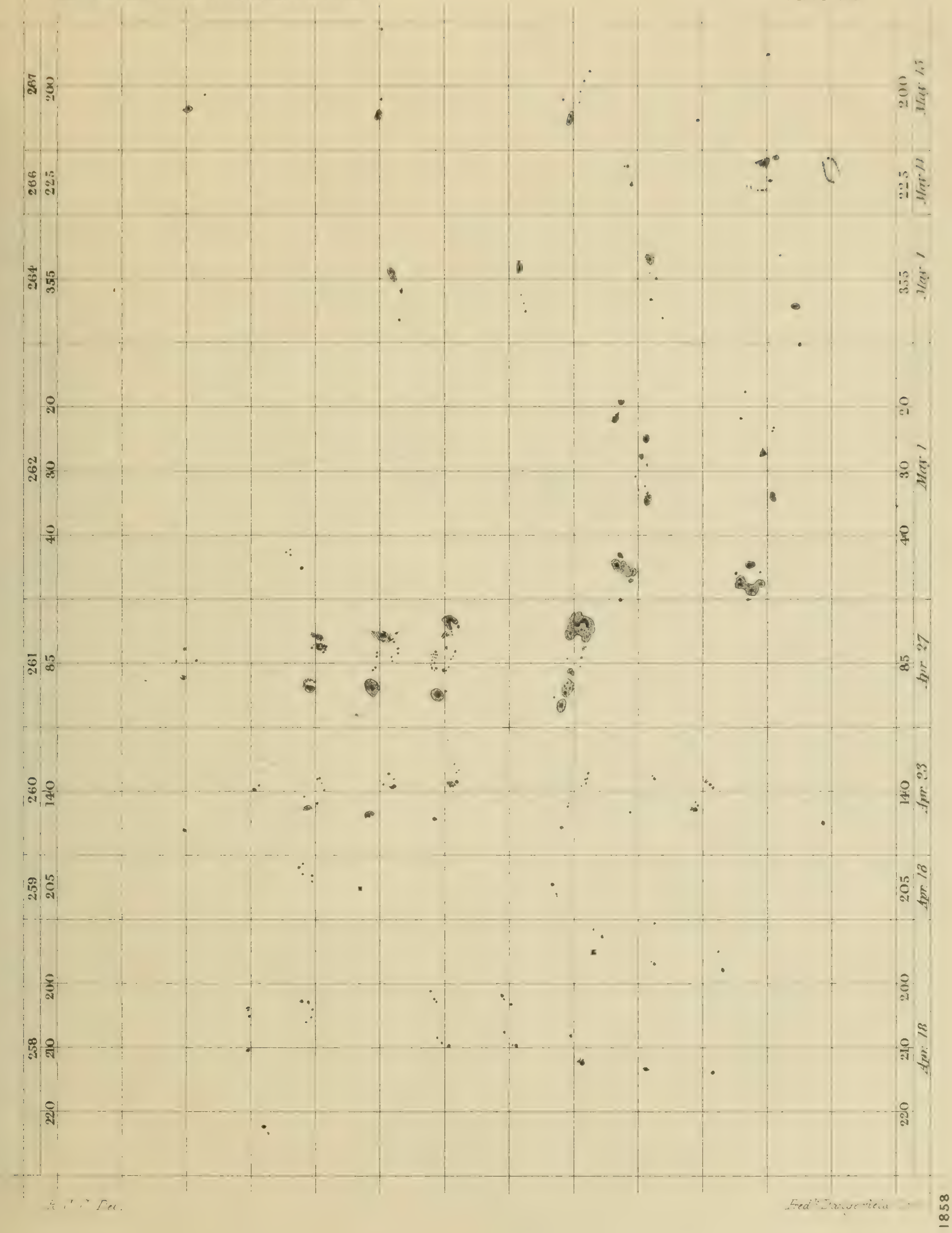
R. C. C. Del. Fred^k Dangerfield Lith

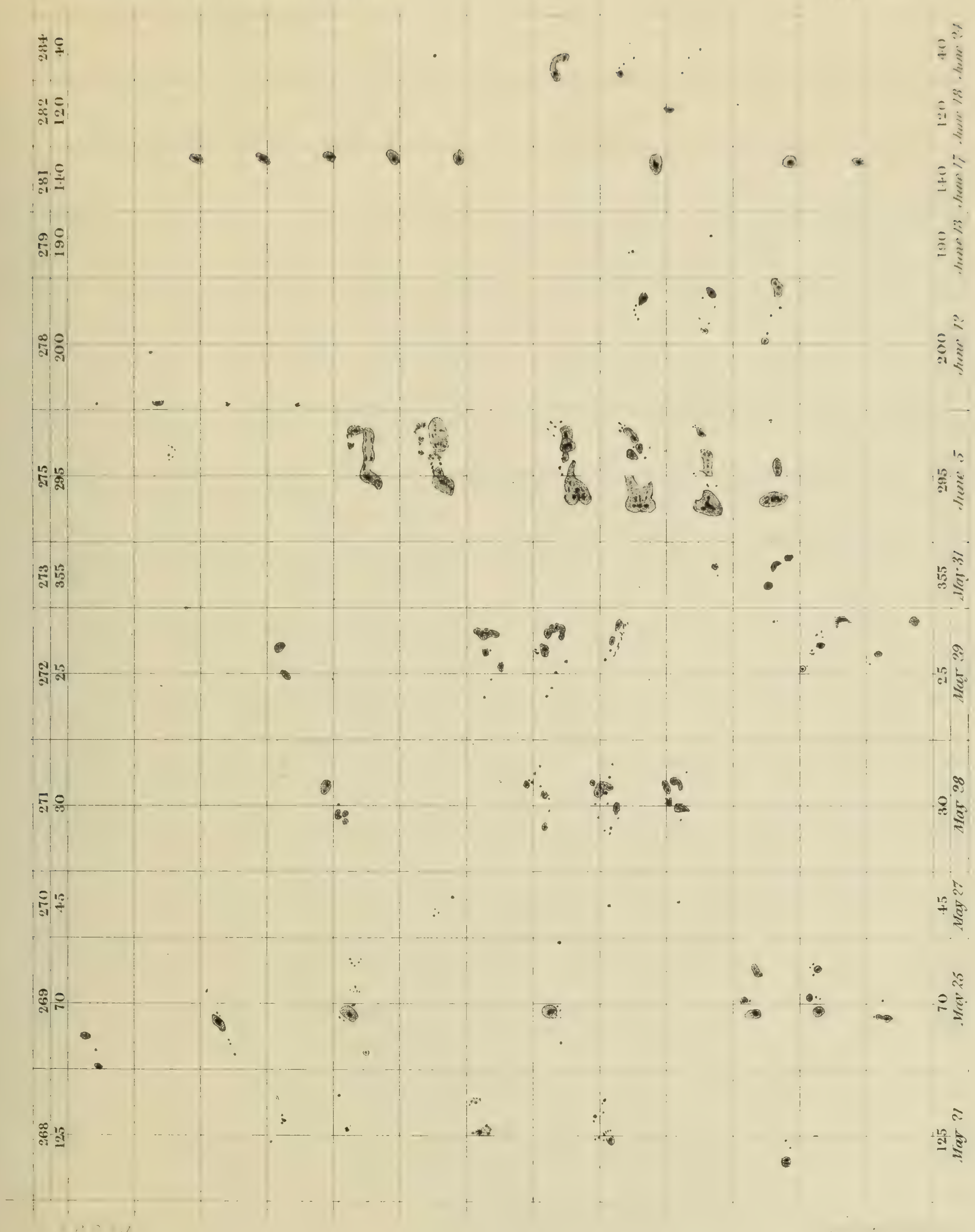
1858

OBS. OF SOLAR SPOTS BY R C. CARRINGTON. PLATE 118

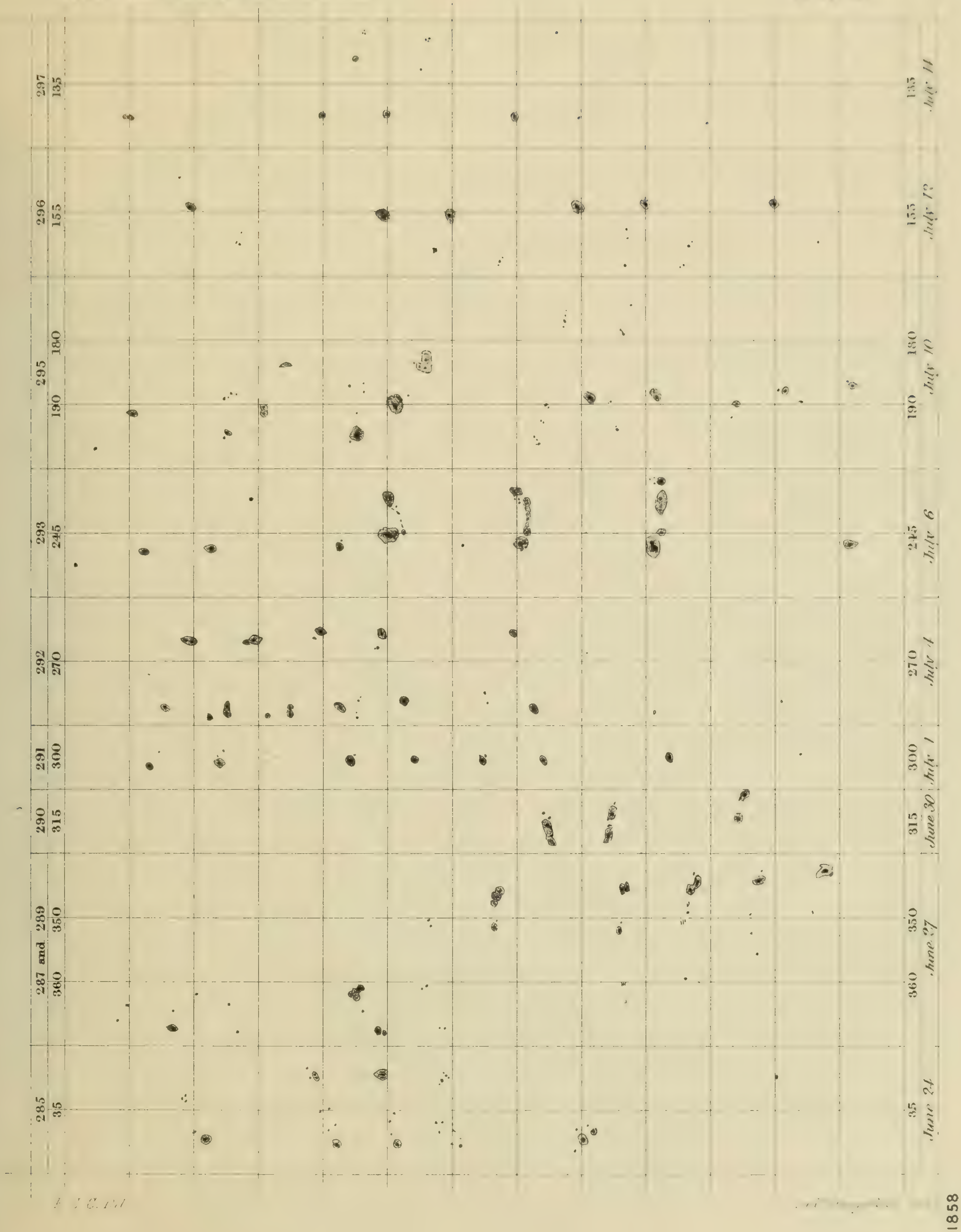


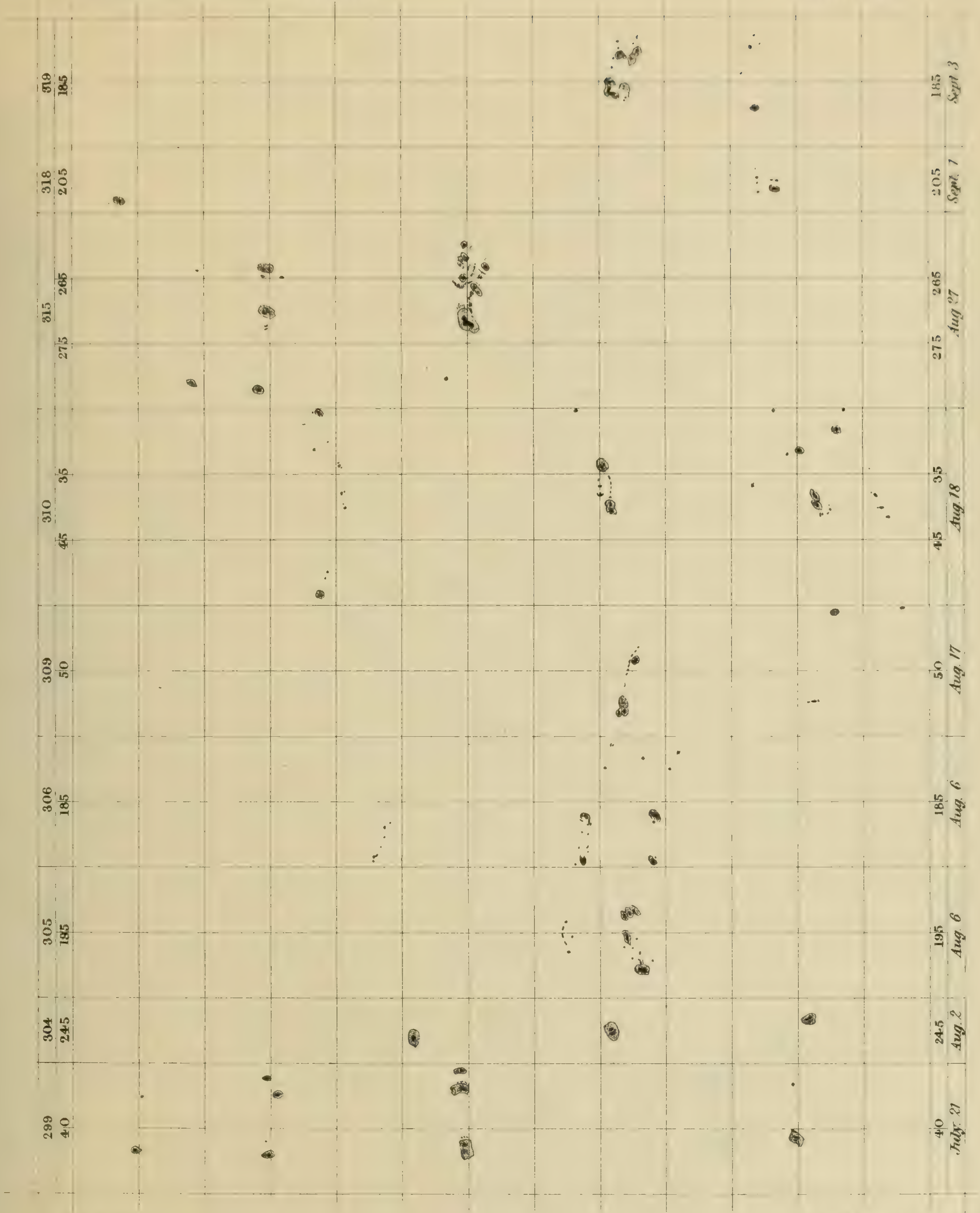
R. C. C. Del. Fred^k Dangerfield 1858


267
200
266
225
264
355
20
262
30
40
261
85
260
140
259
205
200
258
210
220
200
May 15
225
May 11
355
May 1
20
30
May 1
40
85
Apr 27
140
Apr 23
205
Apr 18
200
210
Apr 18
220
1858

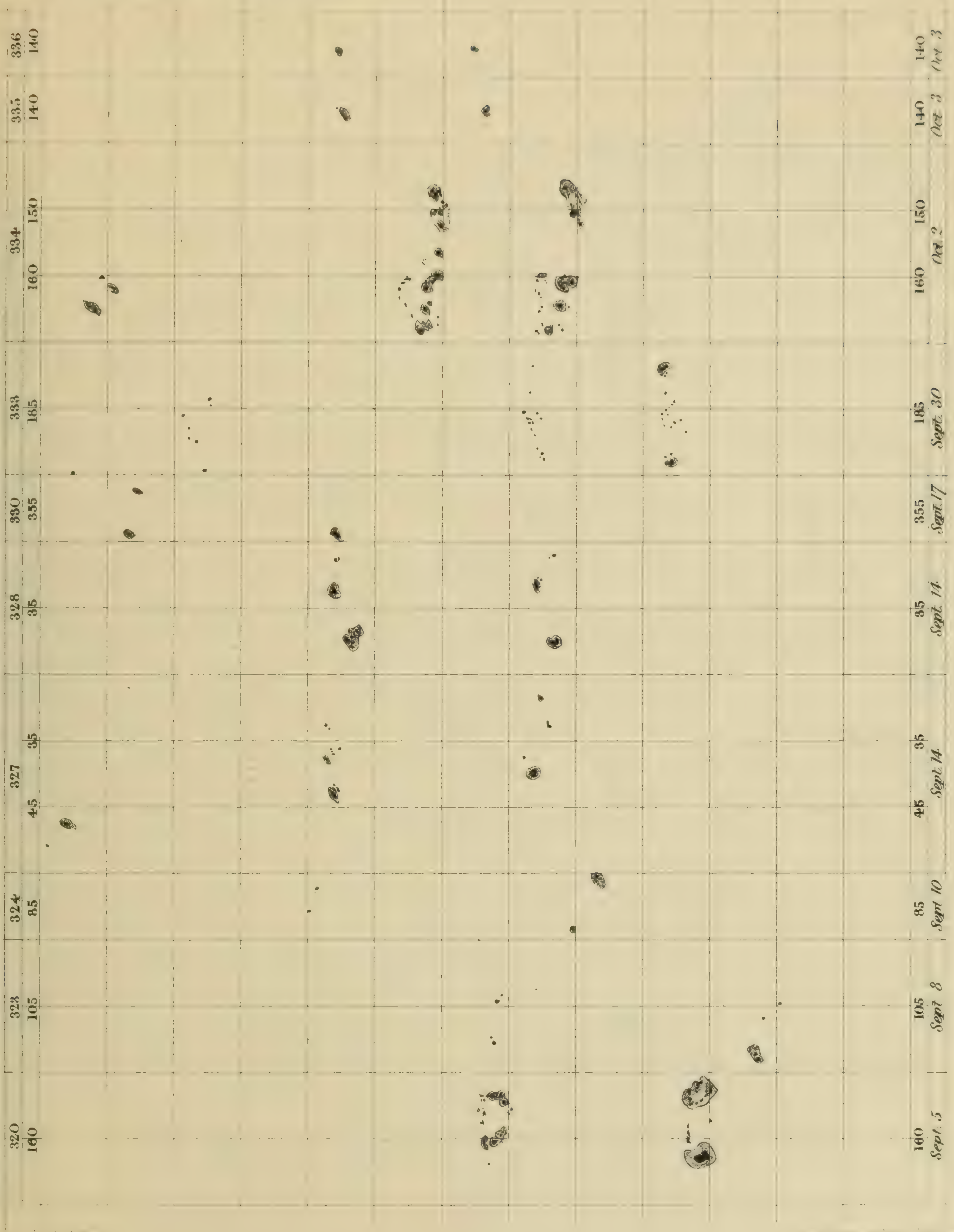

284 40
282 120
281 140
279 190
278 200
275 295
273 355
272 25
271 30
270 45
269 70
268 125
40 June 24
120 June 18
140 June 17
190 June 13
200 June 12
295 June 5
355 May 31
25 May 29
30 May 28
45 May 27
70 May 25
125 May 21

1858


297 135
296 155
295 180 190
293 245
292 270
291 300
290 315
287 and 289 350 360
285 35
135 July 11
155 July 12
180 190 July 10
245 July 6
270 July 4
300 July 1
315 June 30
350 360 June 27
35 June 24
1858


319
185
318
205
315
265
275
310
35
45
309
50
306
185
305
185
304
245
299
40
185 Sept 3
205 Sept 1
265 275 Aug 27
35 45 Aug 18
50 Aug 17
185 Aug 6
195 Aug 6
245 Aug 2
40 July 27

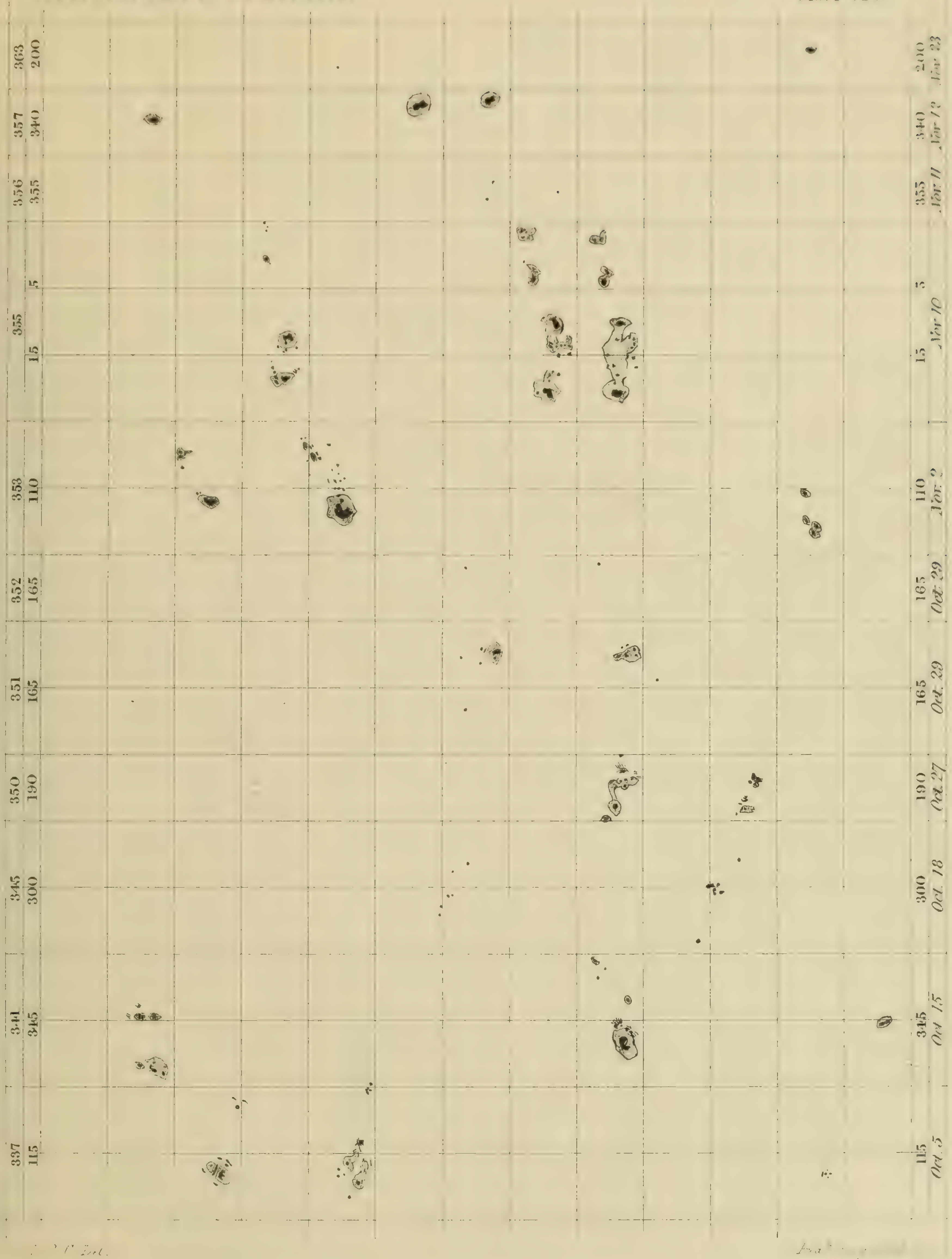
1858.


336
140
335
140
334
150
160
333
185
330
355
328
35
327
35
45
324
85
323
105
320
160
140
Oct 3
140
Oct 3
150
Oct 2
160
185
Sept. 30
355
Sept. 17
35
Sept. 14
35
Sept. 14
45
85
Sept. 10
105
Sept. 8
160
Sept. 5

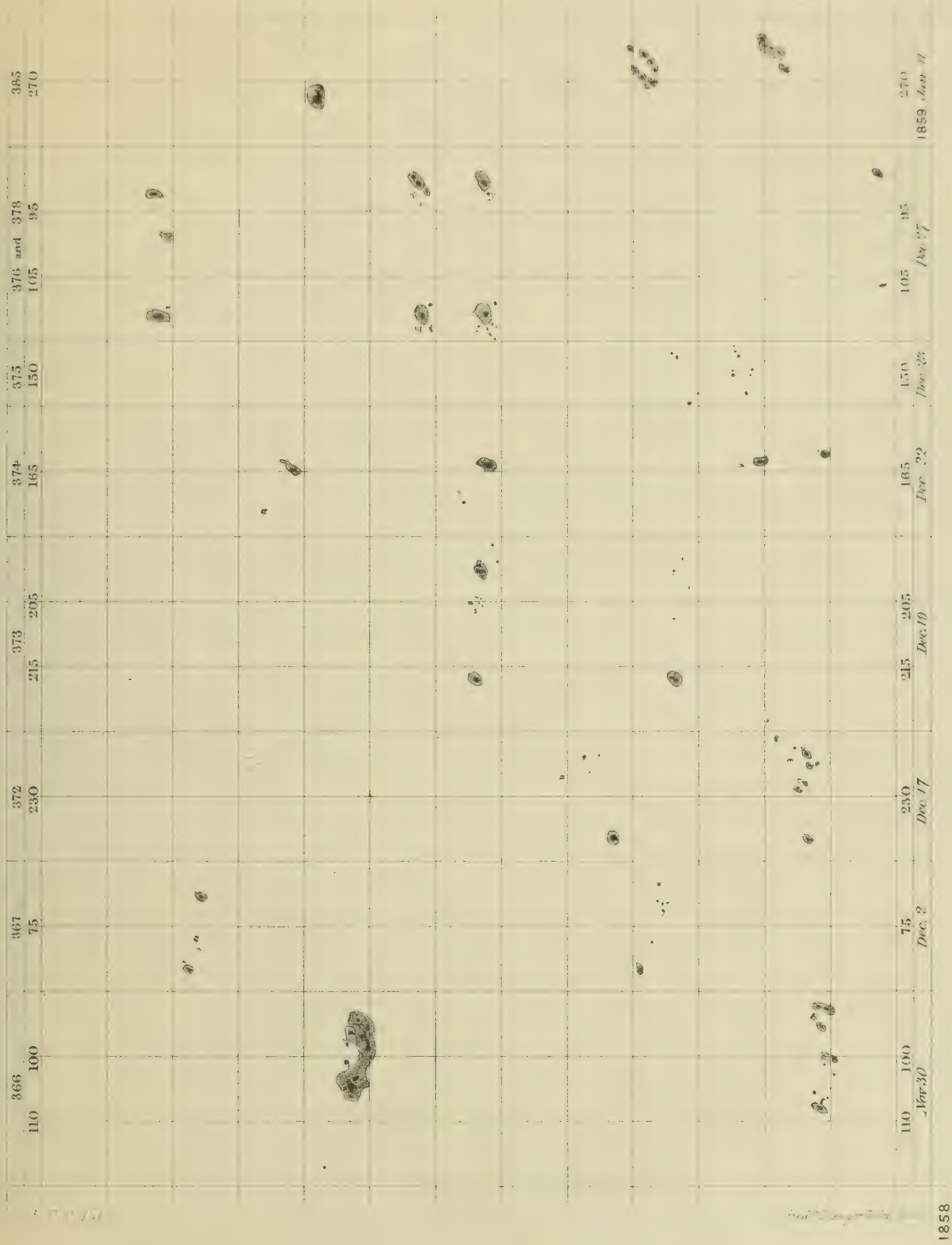
1858

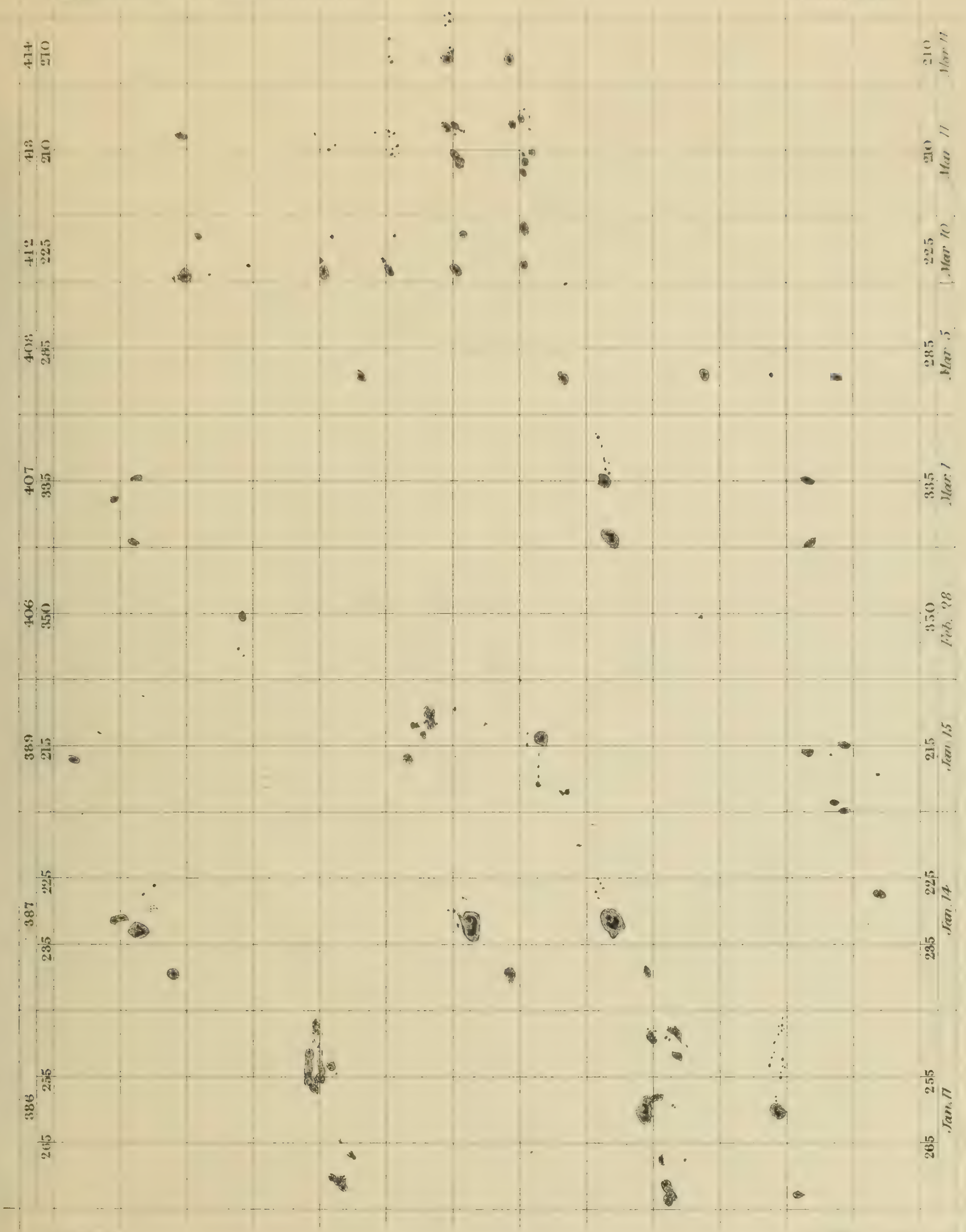
OBS. OF SOLAR SPOTS BY R.C. CARRINGTON

PLATE 124.

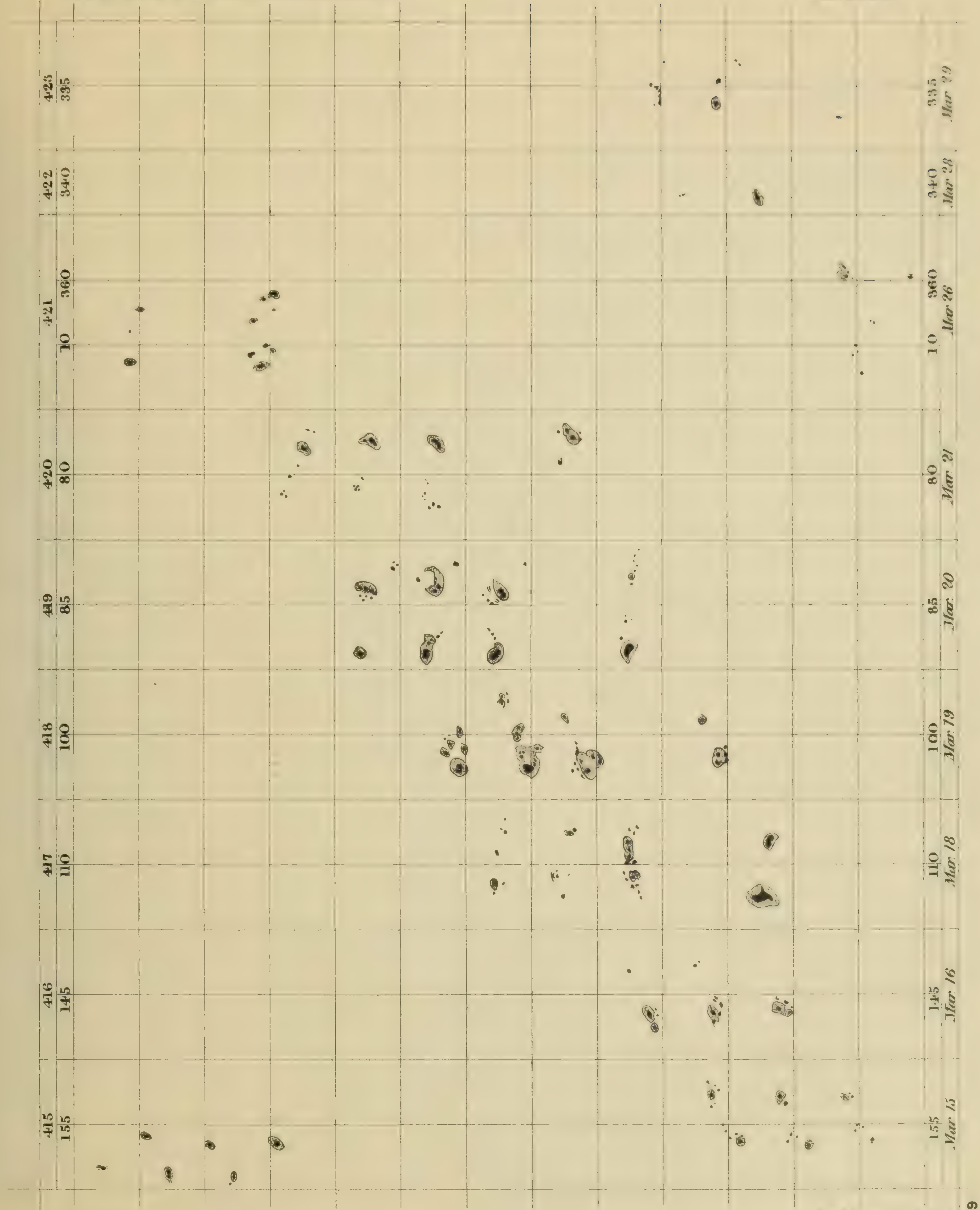


1858


385 270
376 and 378 105 95
375 150
374 165
373 215 205
372 230
367 75
366 110 100
270 1859 Jan
105 95 Dec 27
150 Dec 23
165 Dec 22
215 205 Dec 19
230 Dec 17
75 Dec 2
110 100 Nov 30
1858


414 210
413 210
412 225
408 285
407 335
406 350
389 215
387 225 235
386 255 265
210 Mar 11
210 Mar 11
225 Mar 10
285 Mar 5
335 Mar 1
350 Feb. 28
215 Jan 15
225 235 Jan 14
255 265 Jan 17

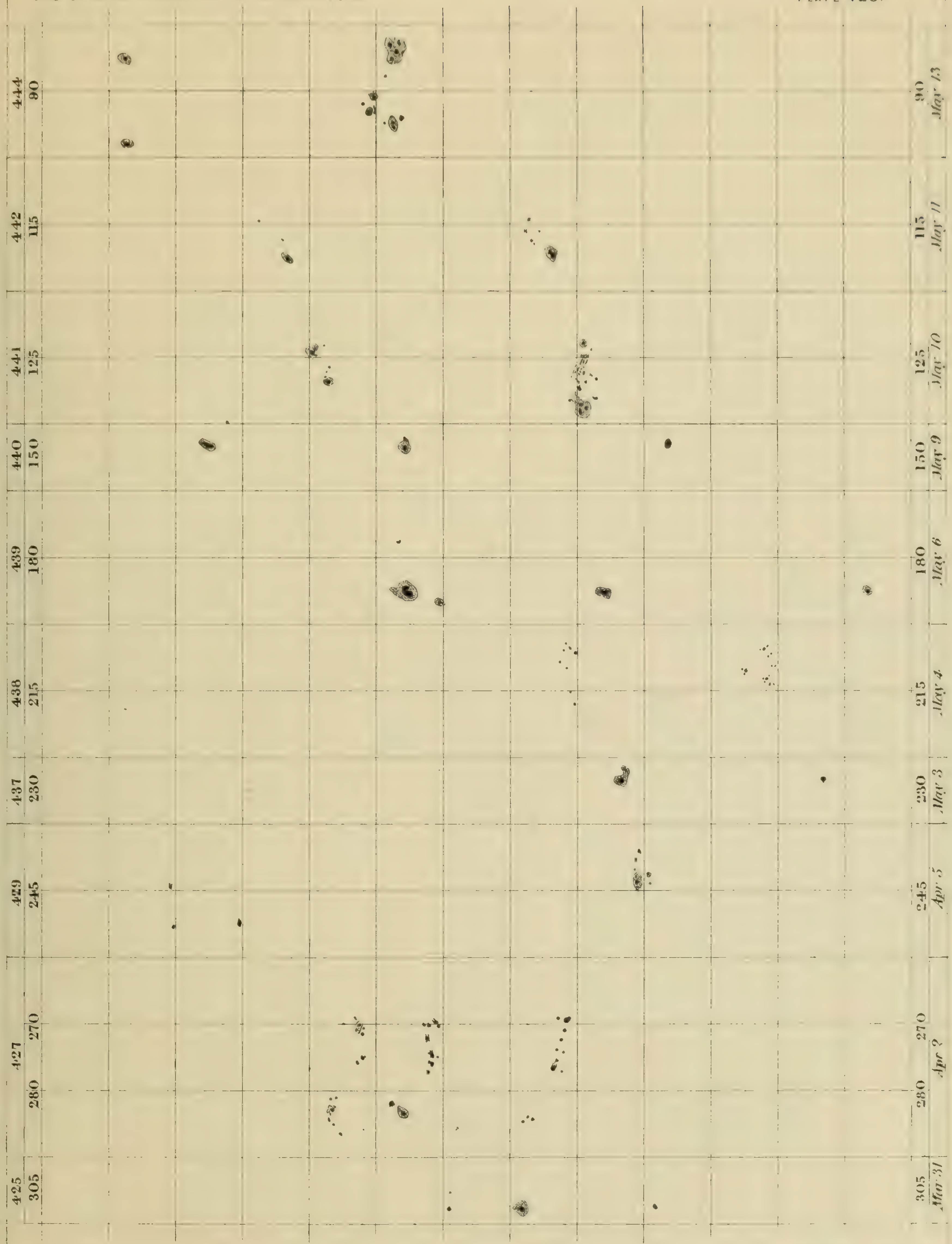
1859


423
335
422
340
421
360
10
420
80
419
85
418
100
417
110
416
145
415
155
335 Mar 29
340 Mar 28
360 Mar 26
10
80 Mar 21
85 Mar 20
100 Mar 19
110 Mar 18
145 Mar 16
155 Mar 15

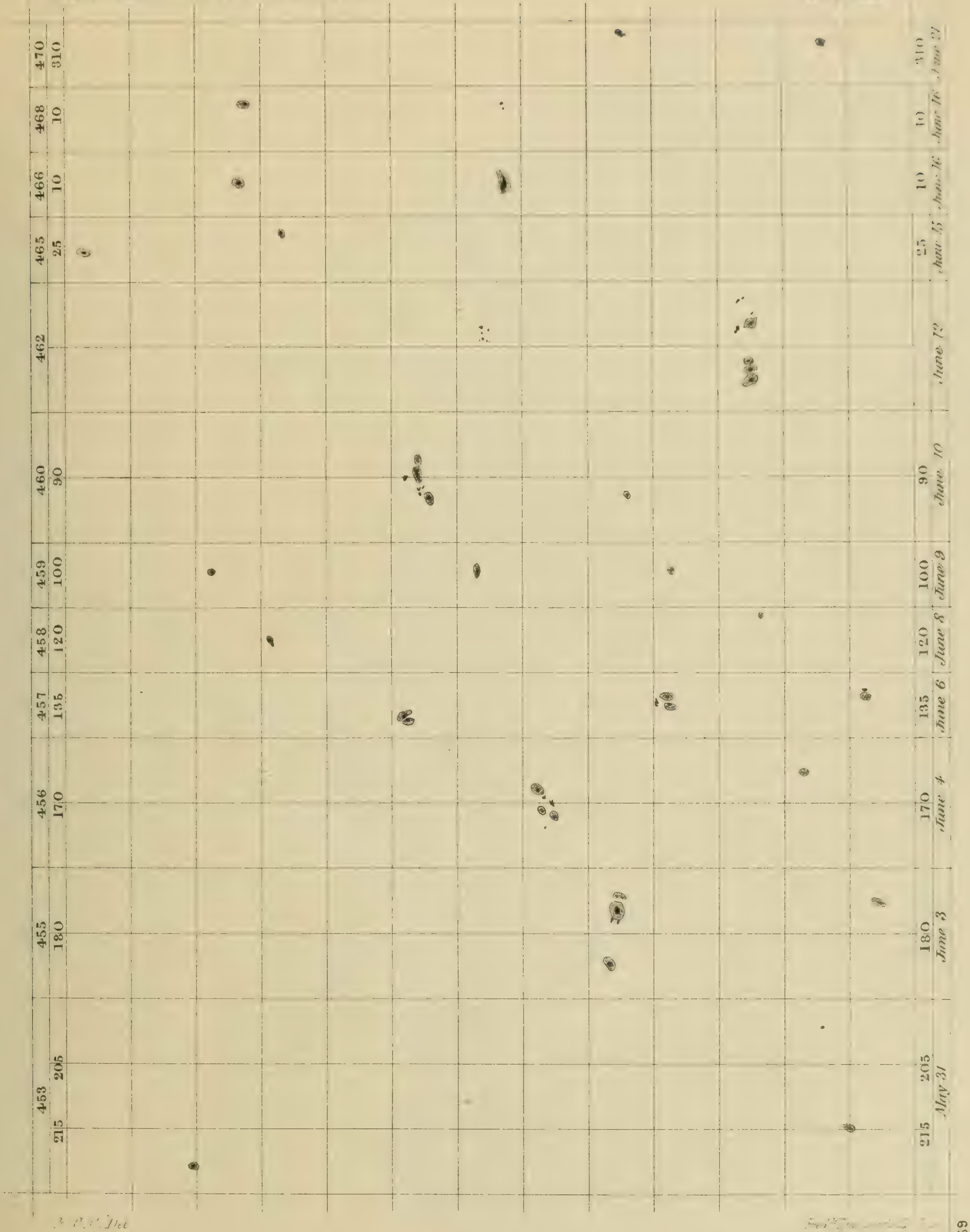
R. C. C. del.

1859

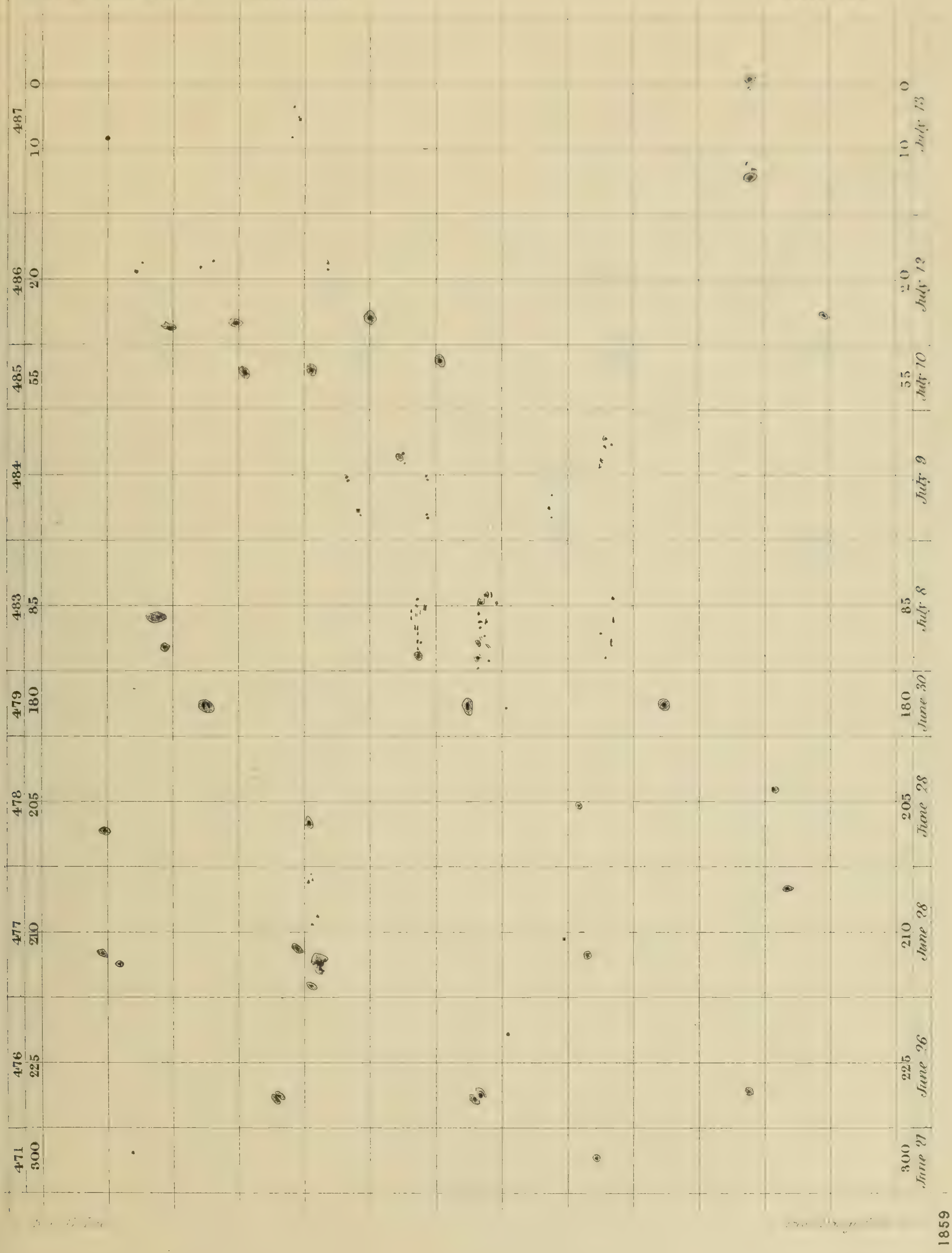
Obs. of Solar Spots by R.C. Carrington   Plate 128.

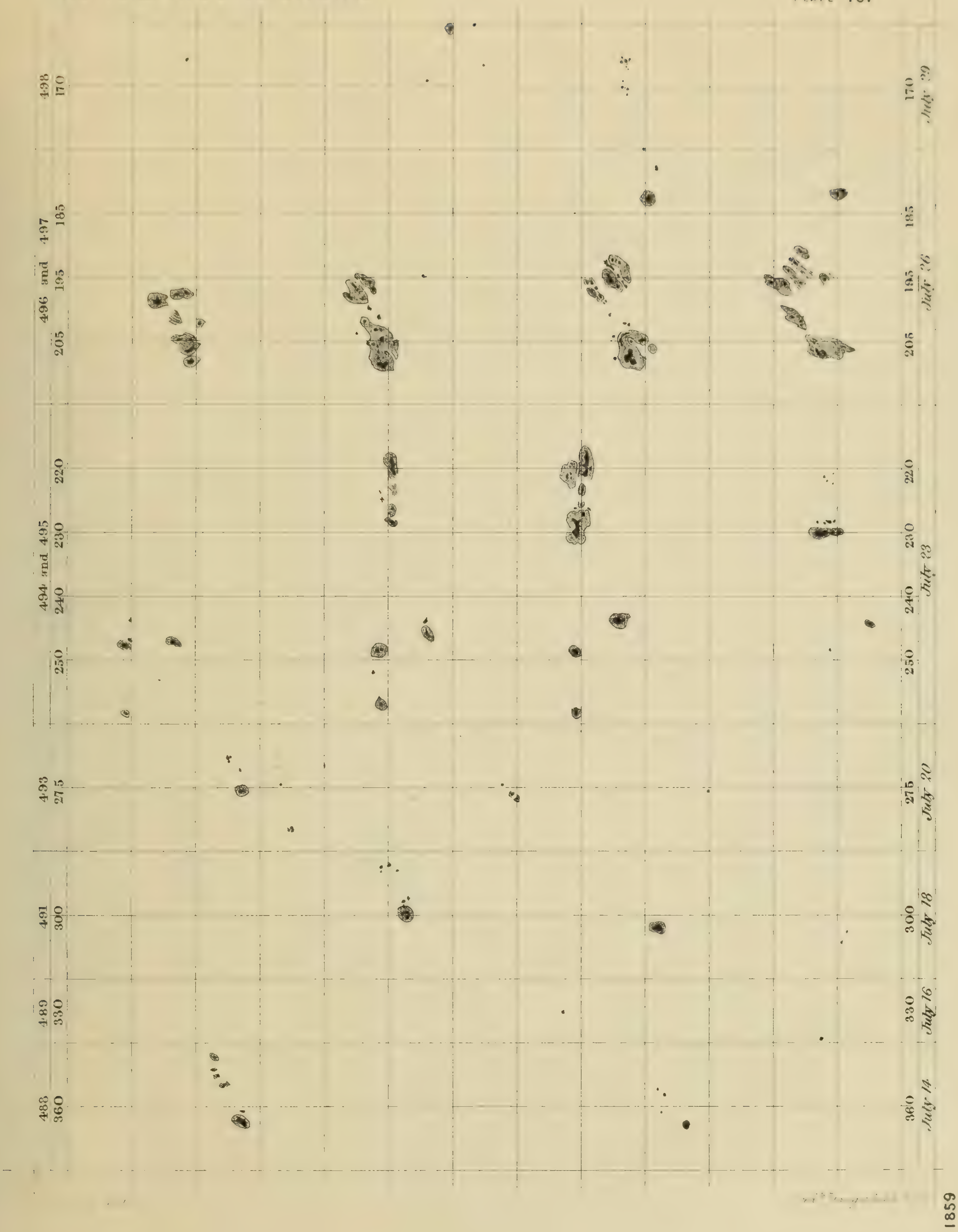


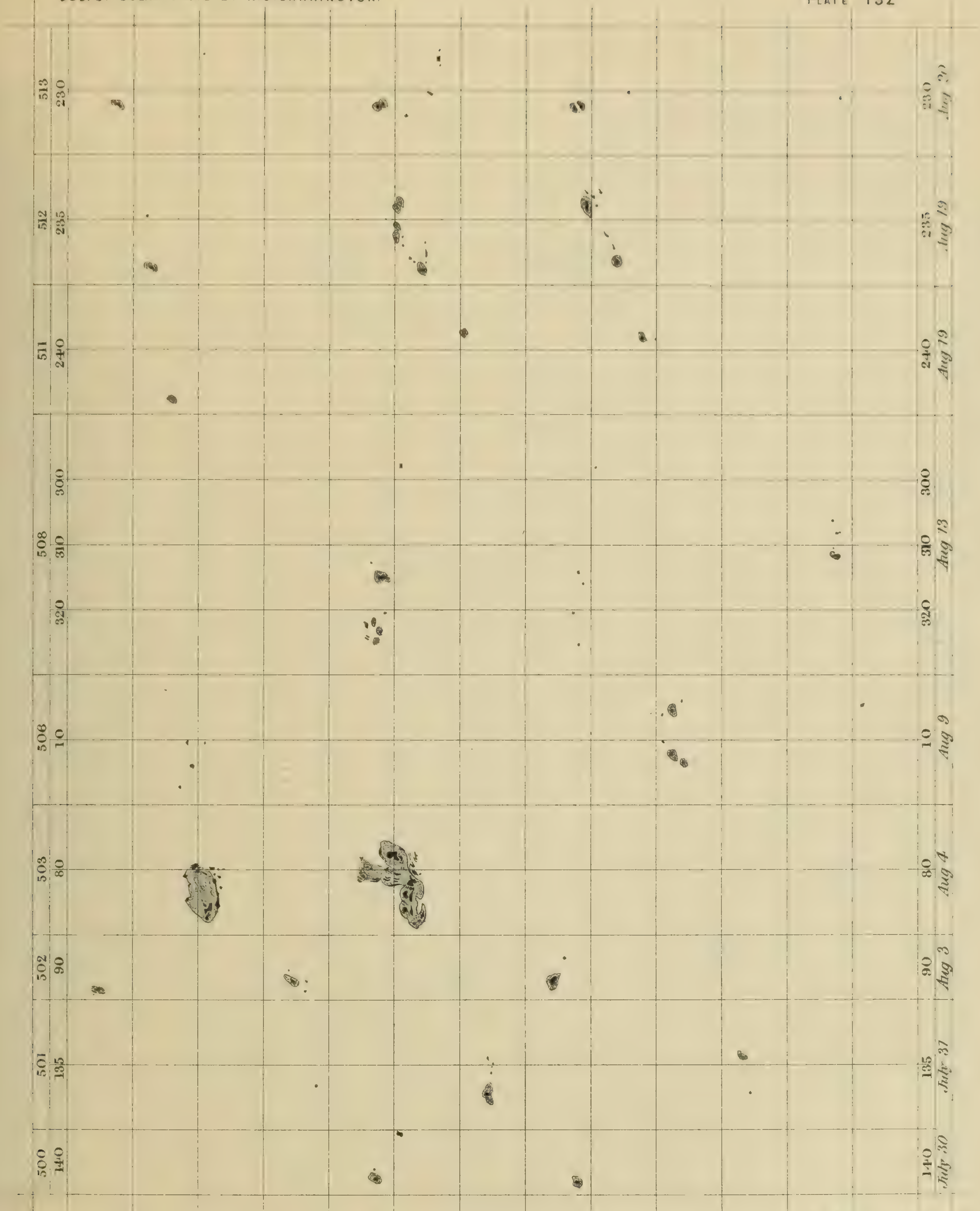
1859


470
310
468
10
466
10
465
25
462
460
90
459
100
458
120
457
135
456
170
455
180
453
205
215
310
10
10
June 16
25
June 15
June 12
June 10
90
100
June 9
120
June 8
135
June 6
170
June 4
180
June 3
205
May 31
215

1859

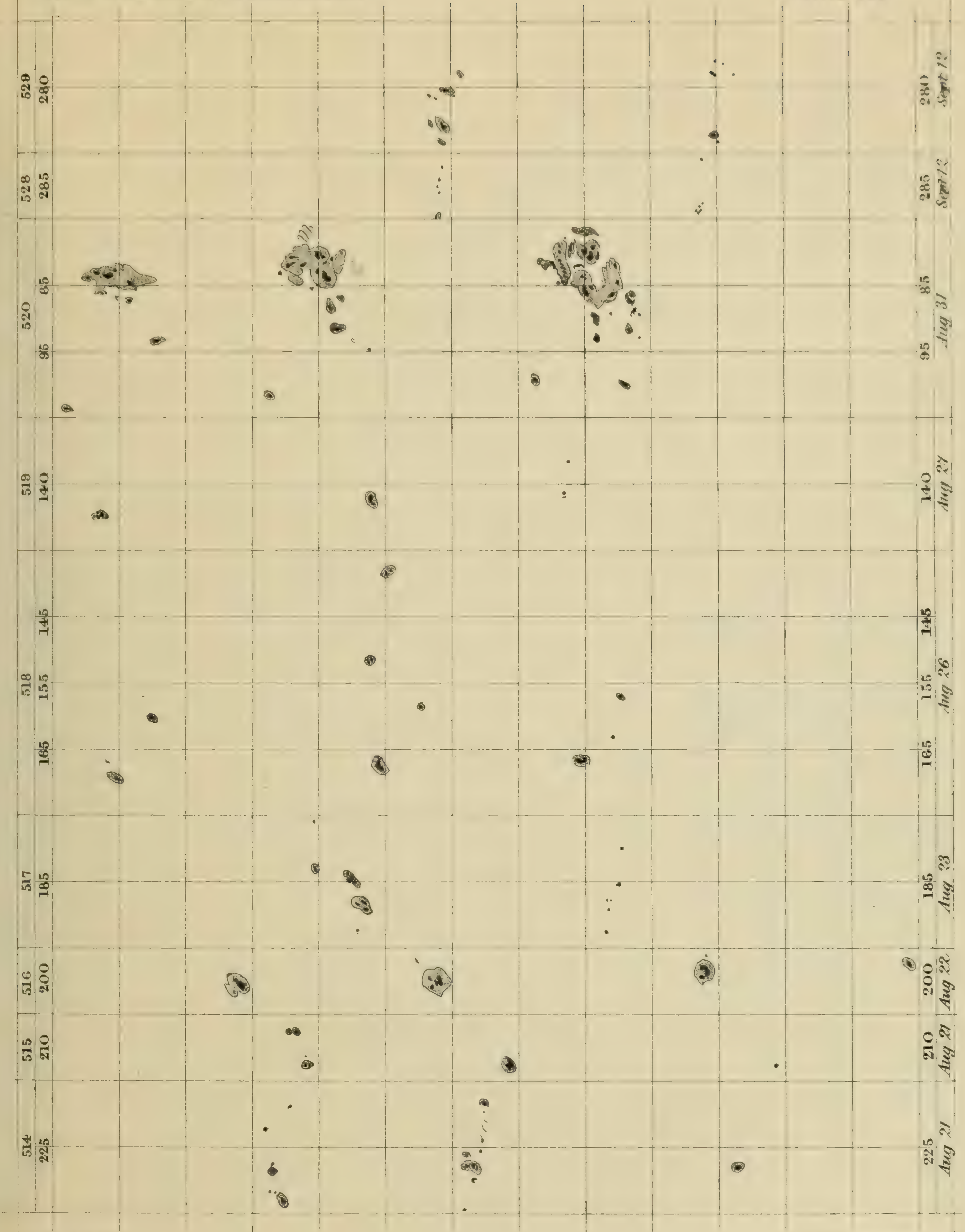

487 10 0
486 20
485 55
484
483 85
479 180
478 205
477 210
476 225
471 300
0 10 July 13
20 July 12
55 July 10
July 9
85 July 8
180 June 30
205 June 28
210 June 28
225 June 26
300 June 27
1859


498 170
497 185
496 and 195
205
220
494 and 495 230
240
250
493 275
491 300
489 330
488 360
170 July 29
185
195 July 26
205
220
230 July 23
240
250
275 July 20
300 July 18
330 July 16
360 July 14
1859

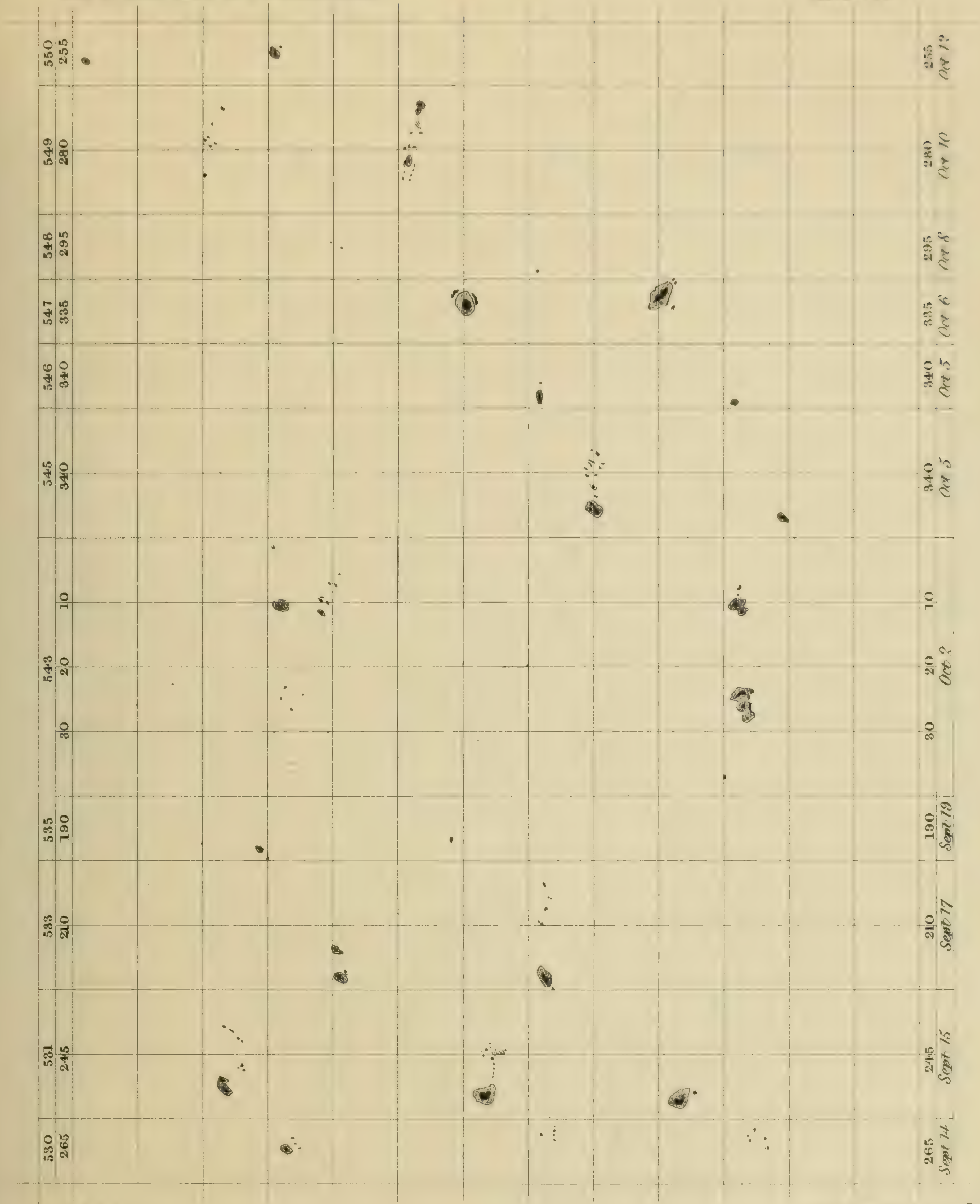

513
230
512
235
511
240
300
508
310
320
506
10
503
80
502
90
501
135
500
140
Aug 19
Aug 13
Aug 9
Aug 4
Aug 3
July 31
July 30

R. C. C. Del.

1859

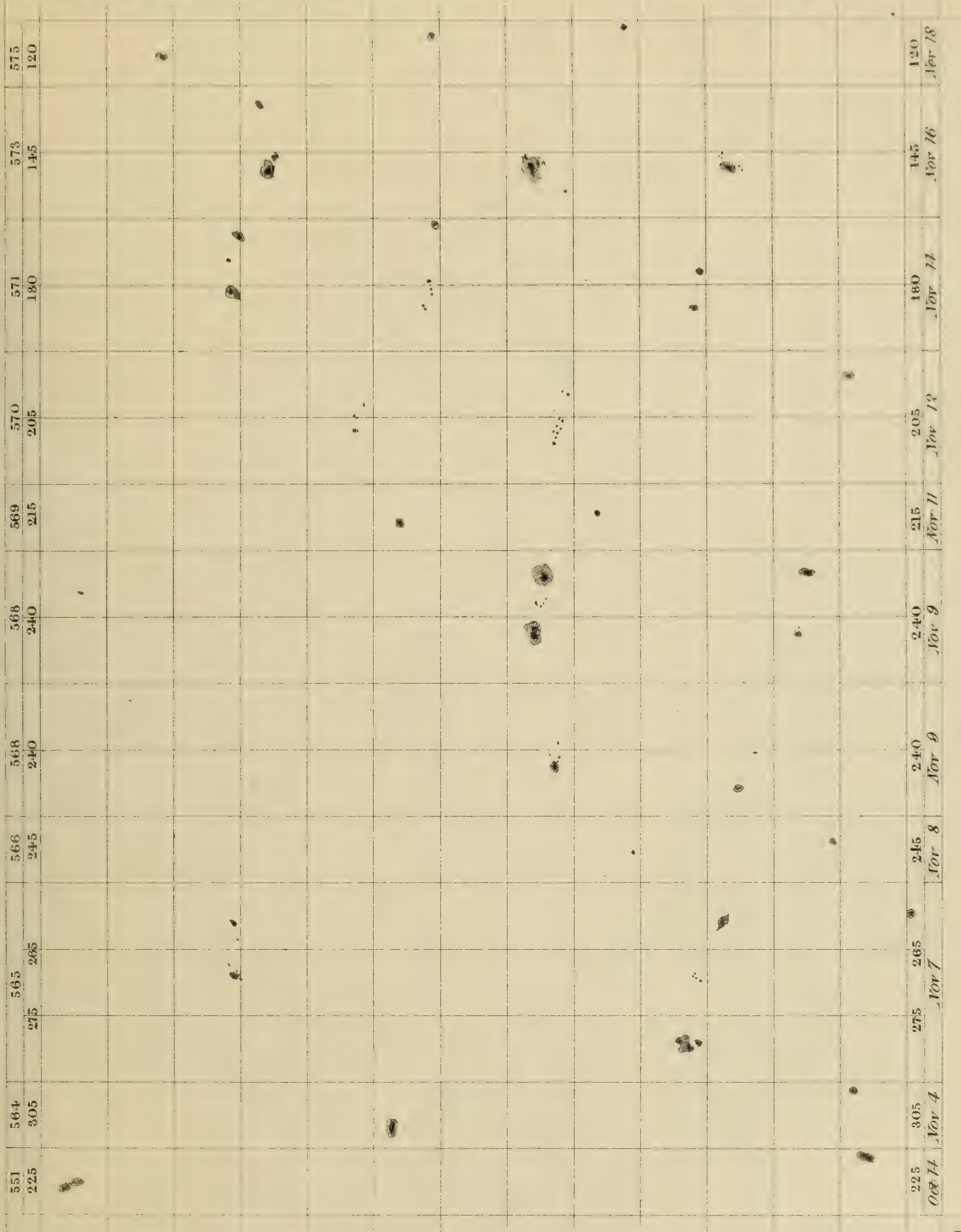

529
280
528
285
520
85
95
519
140
518
145
155
165
517
185
516
200
515
210
514
225
Sept 12
Aug 31
Aug 27
Aug 26
Aug 23
Aug 22
Aug 21

1859

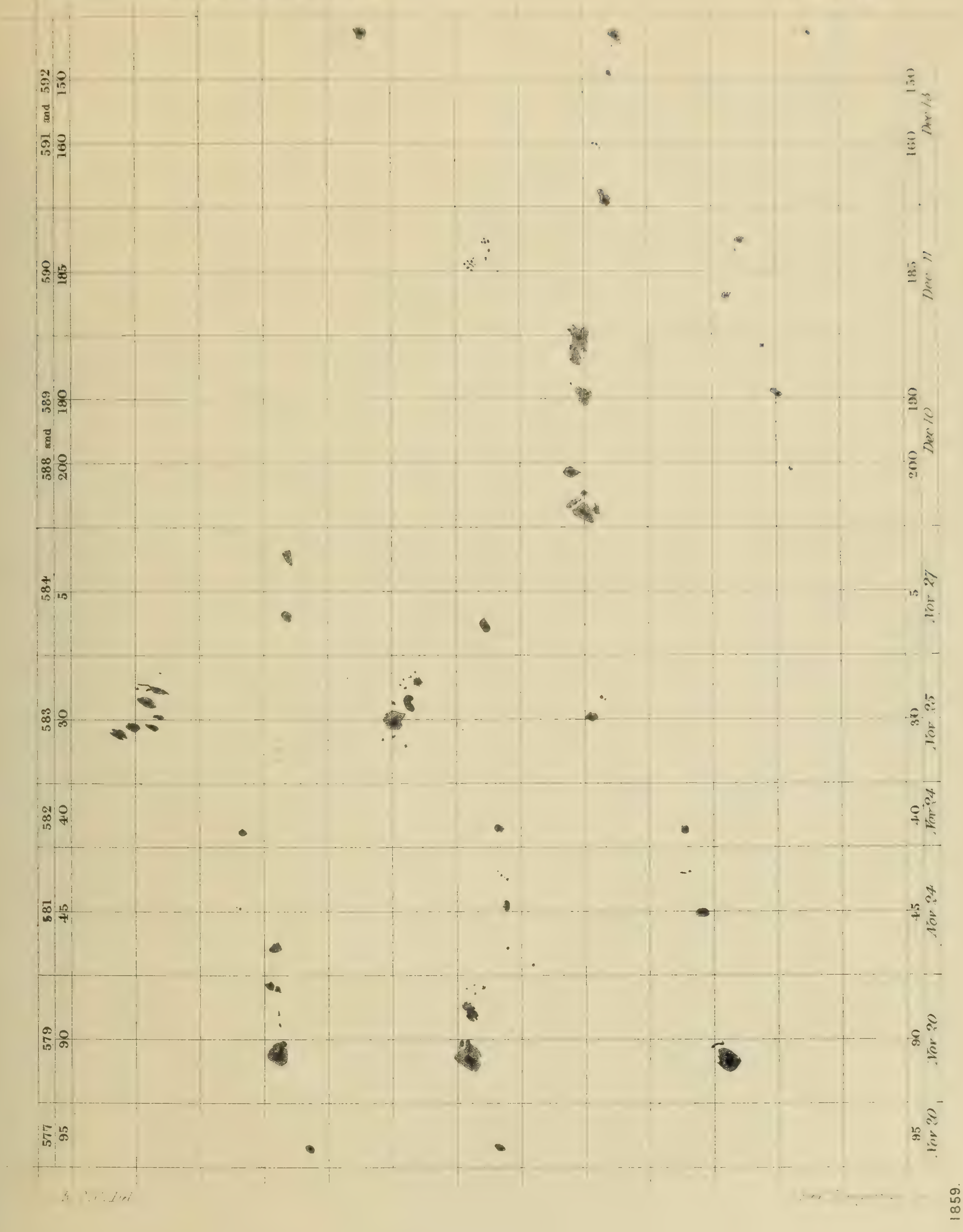

550 255
549 280
548 295
547 335
546 340
545 340
10
543 20
30
535 190
533 210
531 245
530 265
255 Oct 12
280 Oct 10
295 Oct 8
335 Oct 6
340 Oct 5
340 Oct 5
10
20 Oct 2
30
190 Sept 19
210 Sept 17
245 Sept 15
265 Sept 14

1859

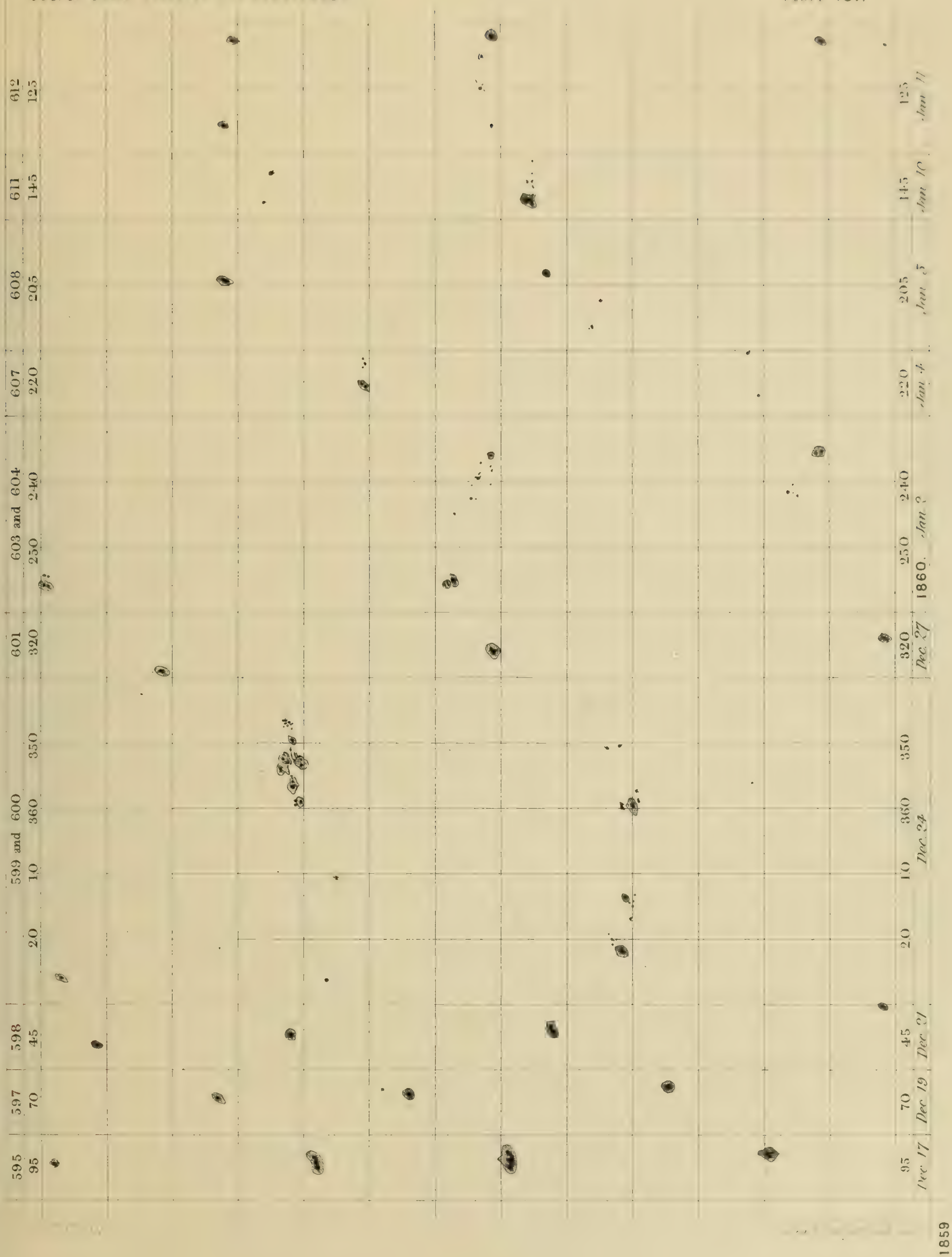
OBS. OF SOLAR SPOTS BY R C CARRINGTON PLATE 135.

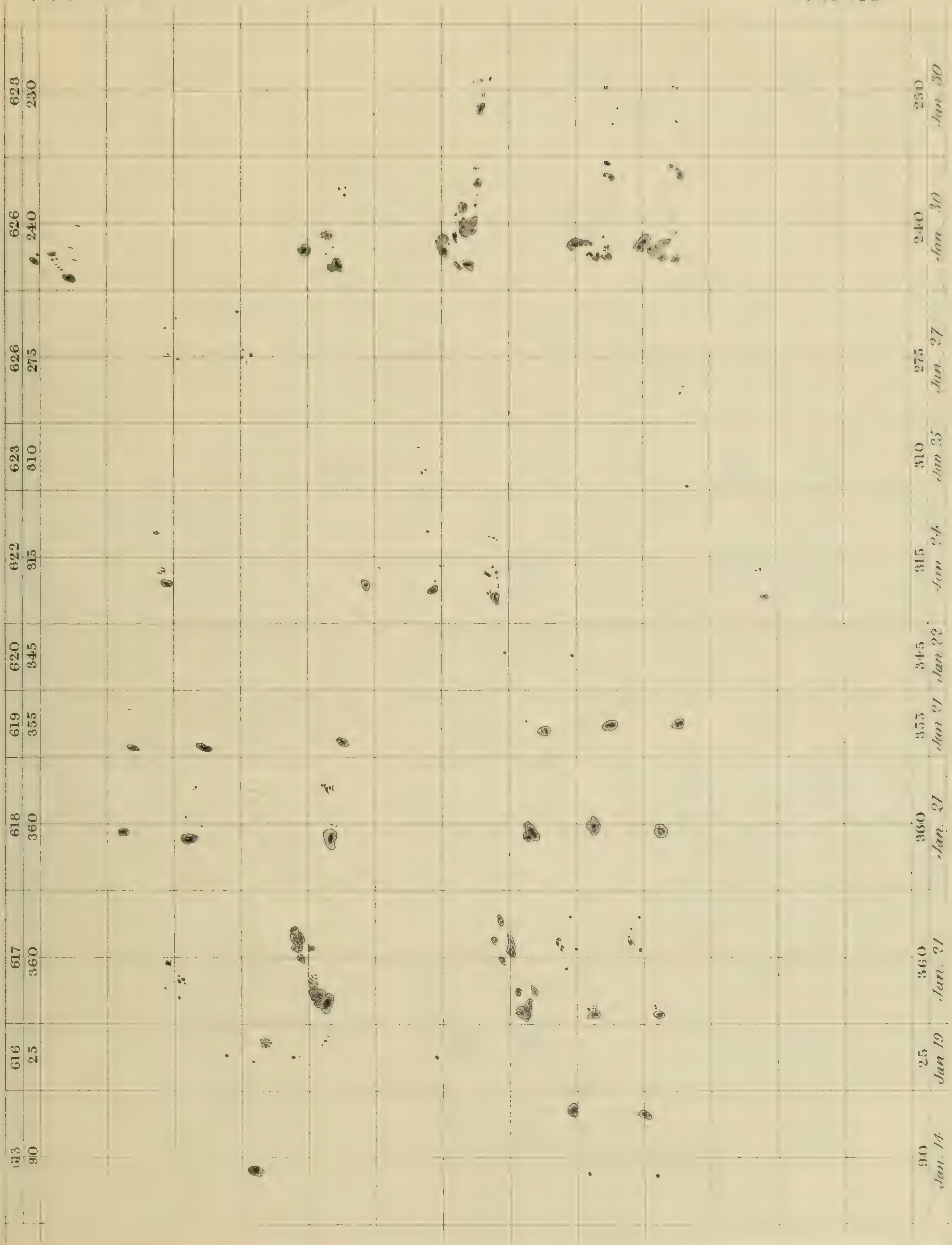


1858

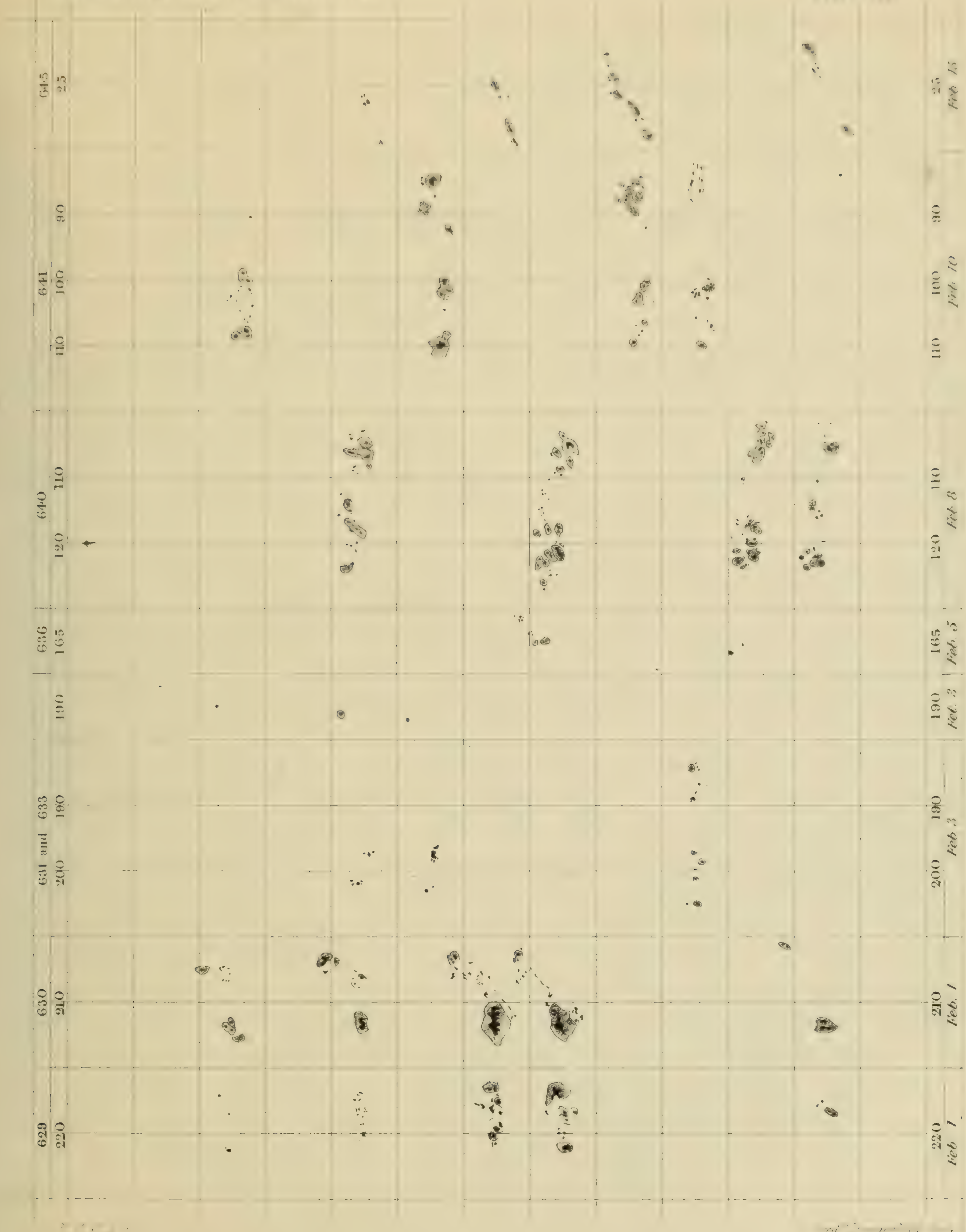

577
95
579
90
581
45
582
40
583
30
584
5
588 and 589
200
190
590
185
591 and 592
160
150
95
Nov 20
90
Nov 20
45
Nov 24
40
Nov 24
30
Nov 25
5
Nov 27
200
Dec 10
190
185
Dec 11
160
150
Dec 13

1859.

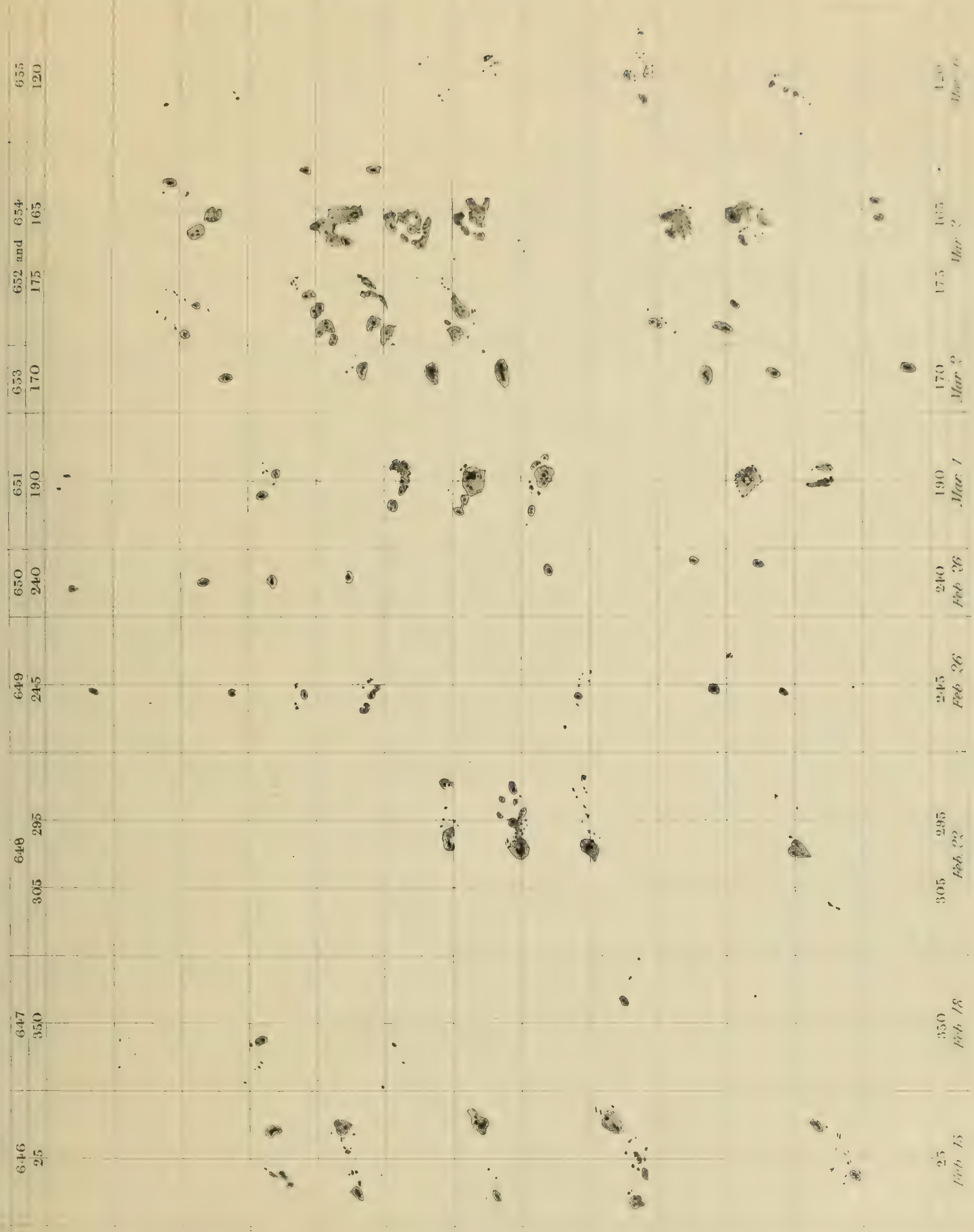

595 95
597 70
598 45
20
599 and 600 10 360
350
601 320
603 and 604 250 240
607 220
608 205
611 145
612 125
95 Dec 17
70 Dec 19
45 Dec 21
20
10 Dec 24
360
350
320 Dec 27
1860.
250 Jan 2
240
220 Jan 4
205 Jan 5
145 Jan 10
125 Jan 11
1859


623 230
626 240
626 275
623 310
622 315
620 345
619 355
618 360
617 360
616 25
613 90
230 Jan 30
240 Jan 30
275 Jan 27
310 Jan 25
315 Jan 24
345 Jan 22
355 Jan 21
360 Jan. 21
360 Jan. 21
25 Jan 19
90 Jan. 14

1860.

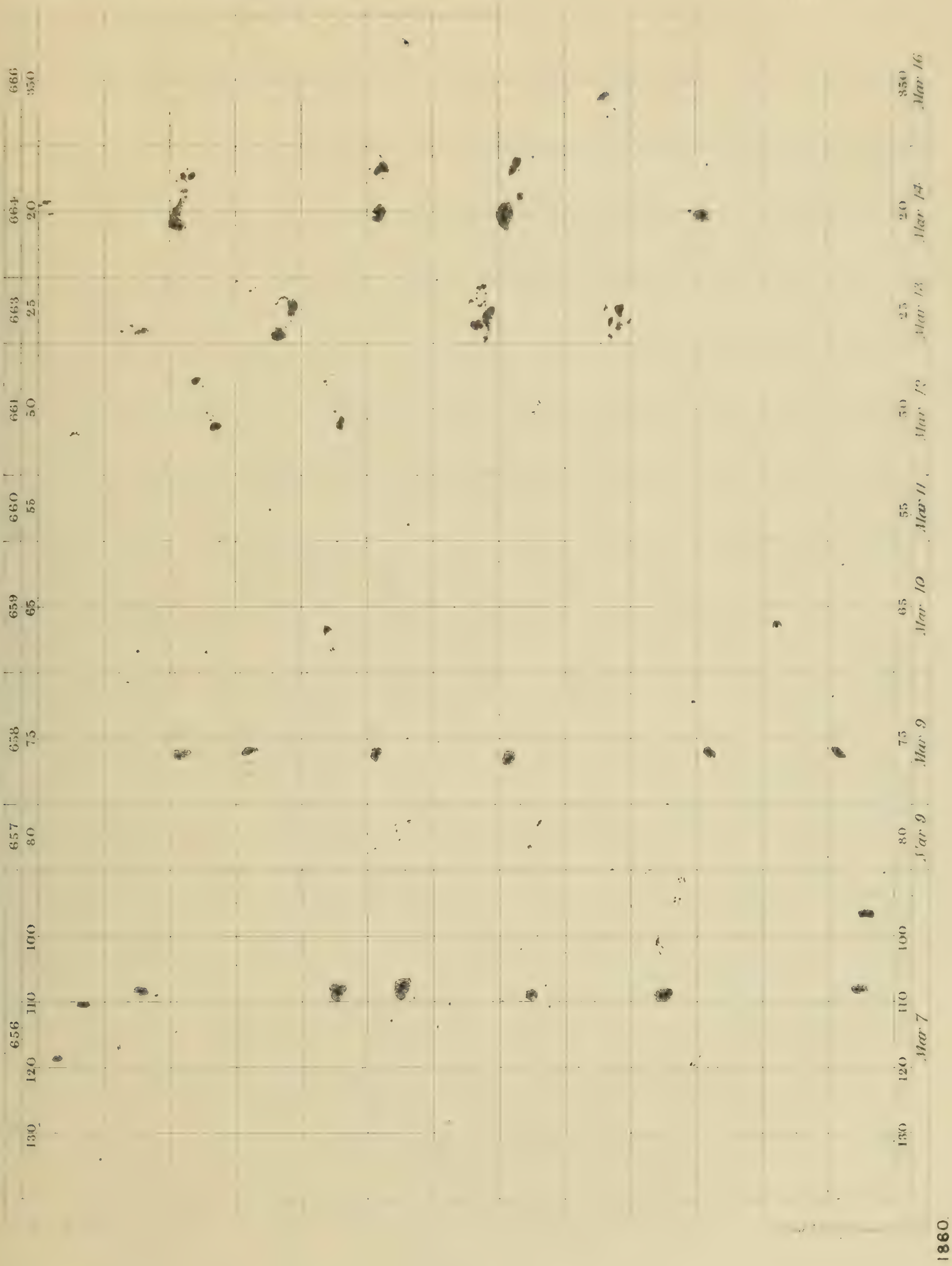

645 25
90
641 100
110
640 110
120
636 165
190
631 and 633 190
200
630 210
629 220

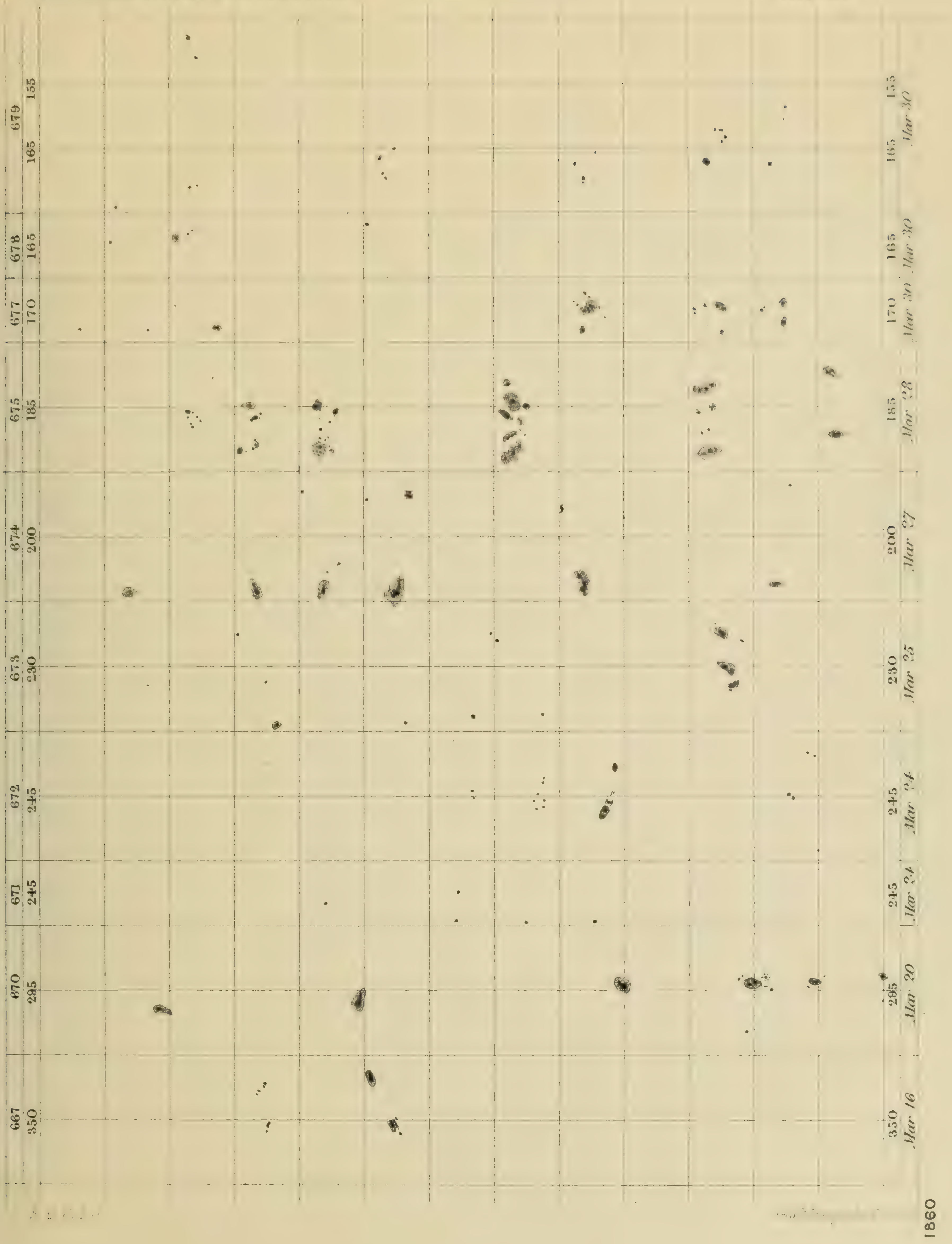
1860.



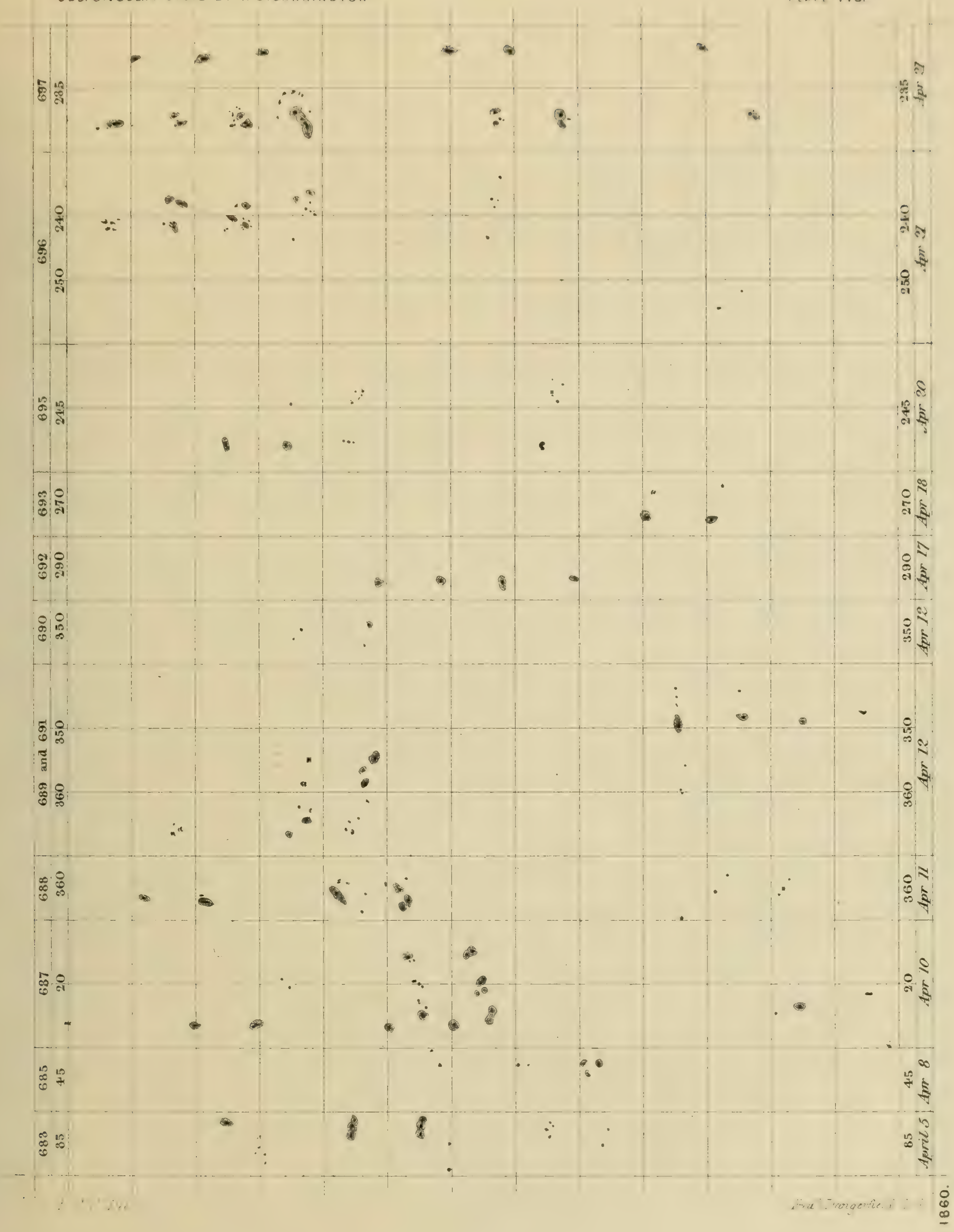
646
25
647
350
648
305
295
649
245
650
240
651
190
653
170
652 and 654
175
165
655
120
Feb 15
Feb 18
Feb 22
Feb 26
Feb 26
Mar 1

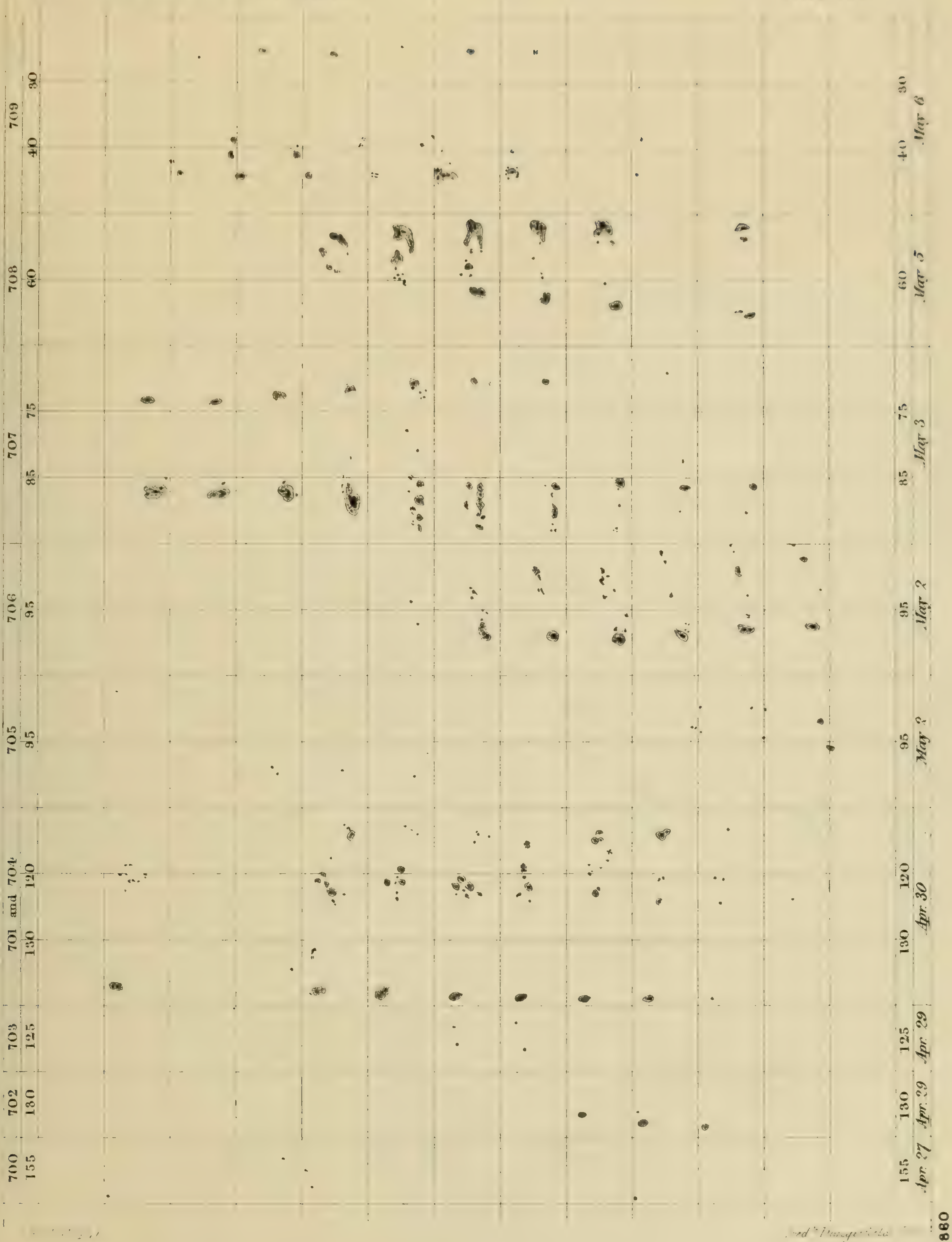
1860.

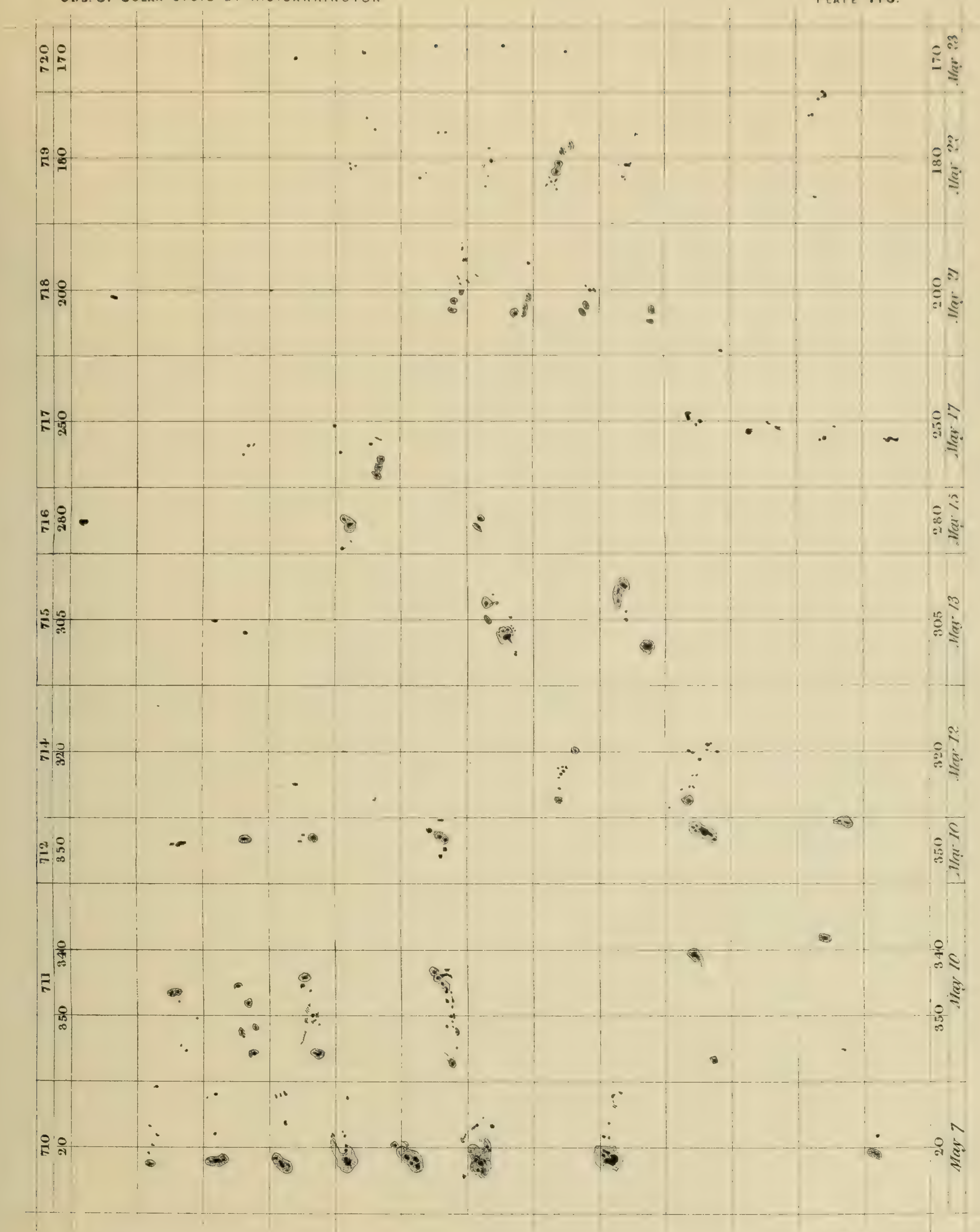

Mar 16
Mar 14
Mar 13
Mar 12
Mar 11
Mar 10
Mar 9
Mar 9
Mar 7
1860

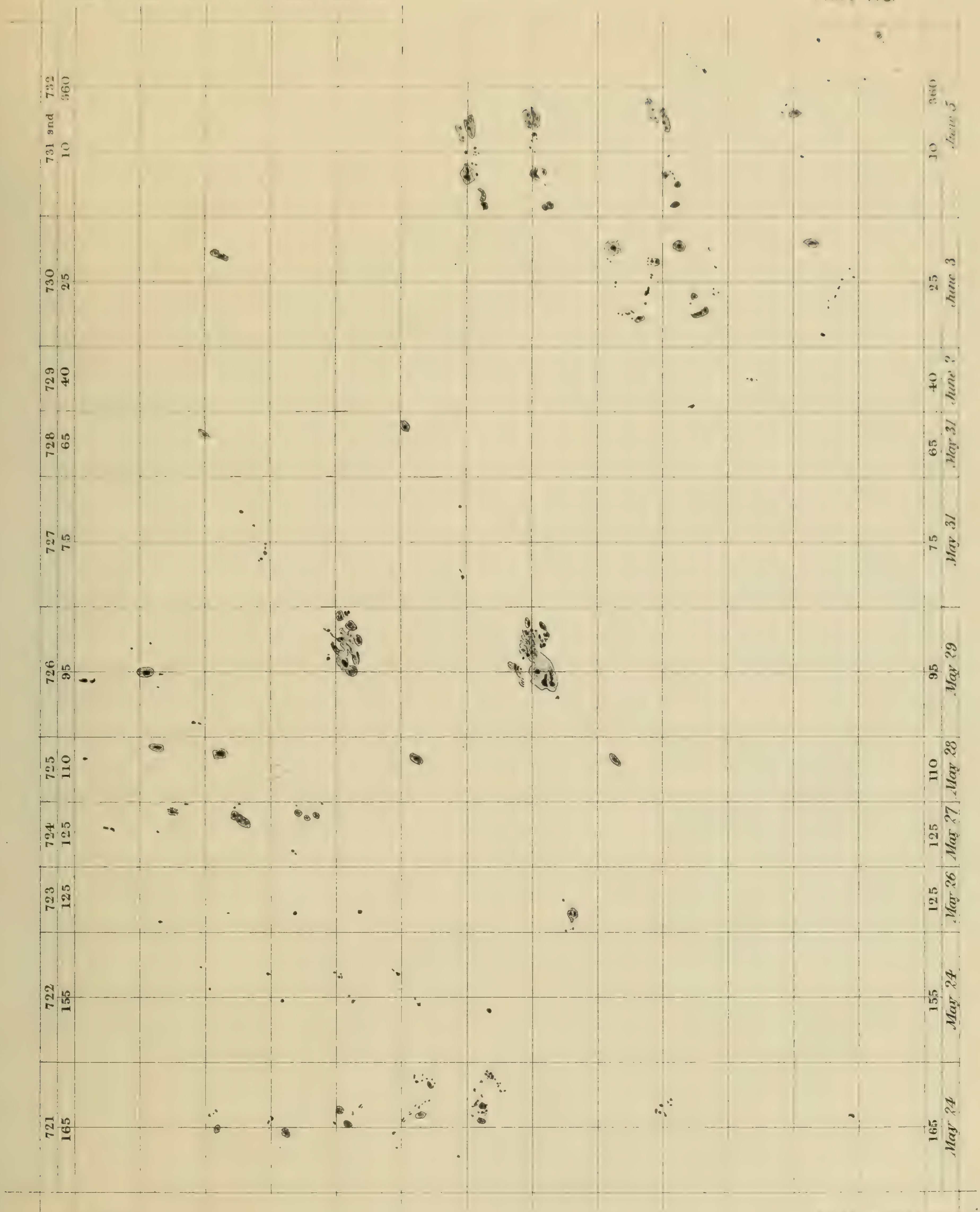

679
155
165
678
165
677
170
675
185
674
200
673
230
672
245
671
245
670
285
667
350
155 Mar 30
165
165 Mar 30
170 Mar 30
185 Mar 28
200 Mar 27
230 Mar 25
245 Mar 24
245 Mar 24
295 Mar 20
350 Mar 16

1860


683 35
685 45
687 20
688 360
689 and 691 360 350
690 350
692 290
693 270
695 245
696 250 240
697 235
85 April 5
45 Apr 8
20 Apr 10
360 Apr 11
360 Apr 12 350
350 Apr 12
290 Apr 17
270 Apr 18
245 Apr 20
250 Apr 21 240
235 Apr 27
1860.

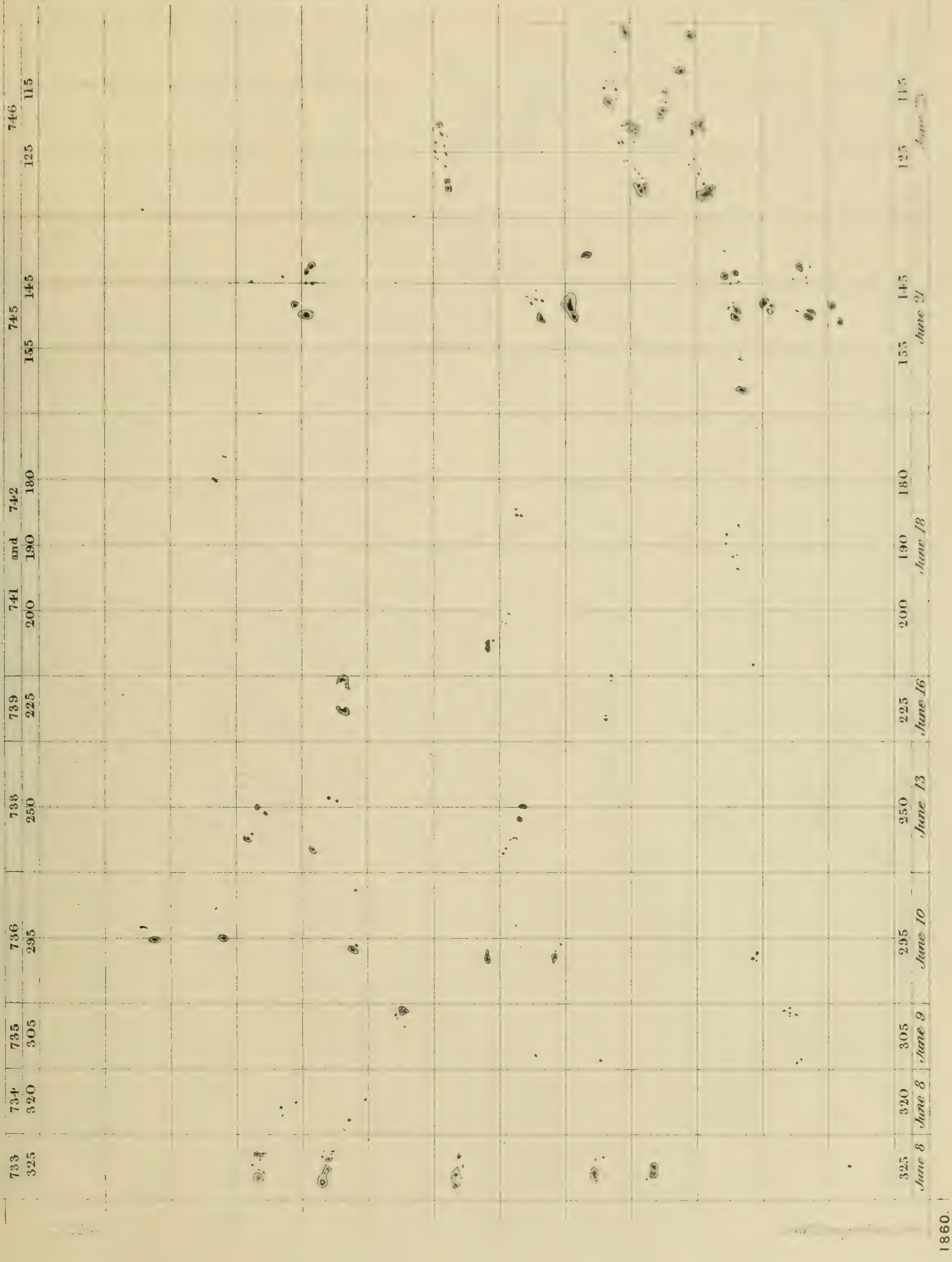

700 155
702 130
703 125
701 and 704 130 120
705 95
706 95
707 85 75
708 60
709 40 30
155 Apr 27
130 Apr 29
125 Apr 29
130 120 Apr 30
95 May 2
95 May 2
85 75 May 3
60 May 5
40 30 May 6
1880


720 170
719 180
718 200
717 250
716 280
715 305
714 320
712 350
711 340 350
710 20
170 May 23
180 May 22
200 May 21
250 May 17
280 May 15
305 May 13
320 May 12
350 May 10
340 May 10 350
20 May 7
1860.


731 and 732
10 360
730
25
729
40
728
65
727
75
726
95
725
110
724
125
723
125
722
155
721
165
June 5
25 June 3
40 June 2
65 May 31
75 May 31
95 May 29
110 May 28
125 May 27
125 May 26
155 May 24
165 May 24

R. C. C. Del

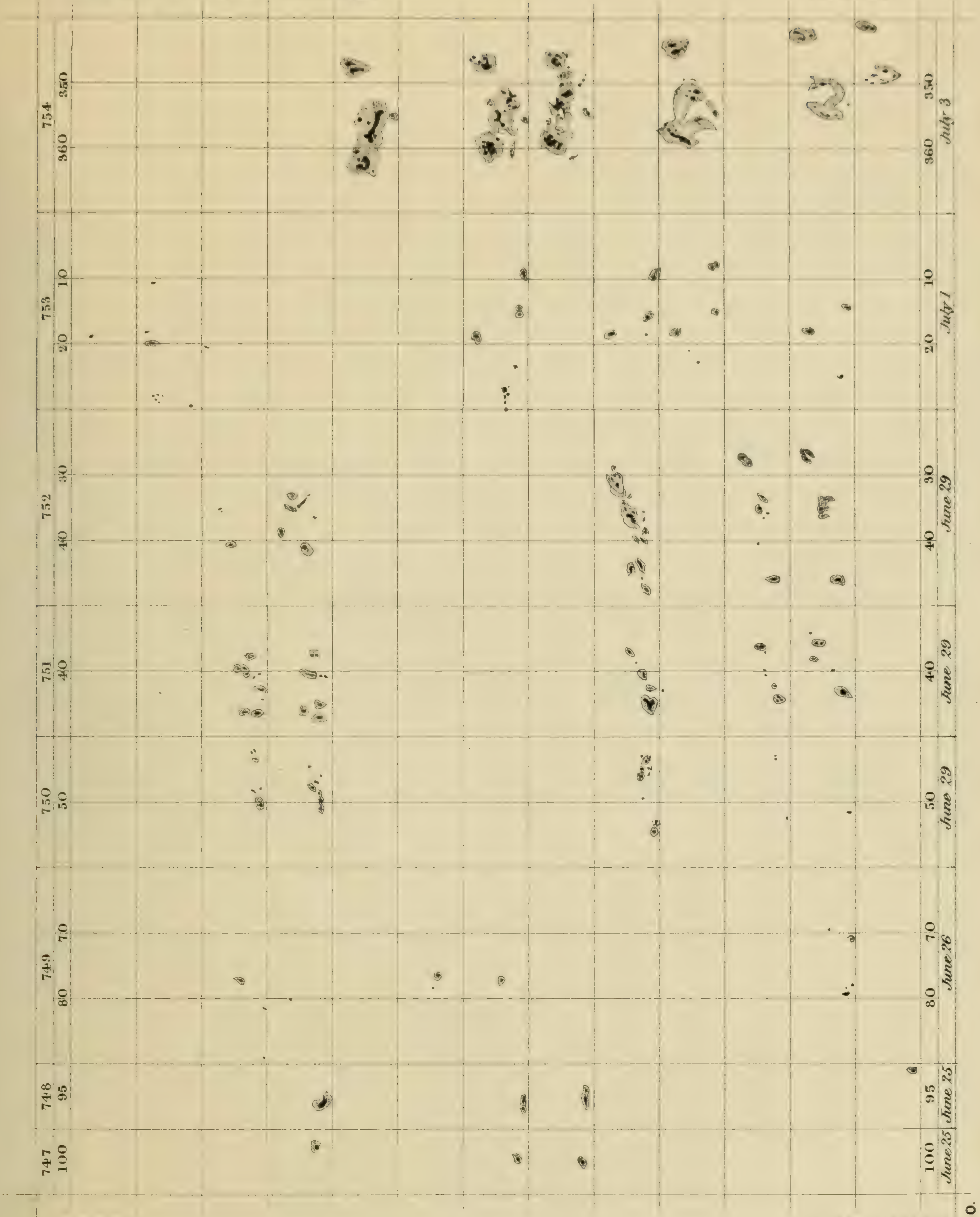
1860.



746
125
115
745
155
145
742 and 741
200
190
180
739
225
738
250
736
295
735
305
734
320
733
325
June 8
June 8
June 9
June 10
June 13
June 16
June 18
June 21
1860.

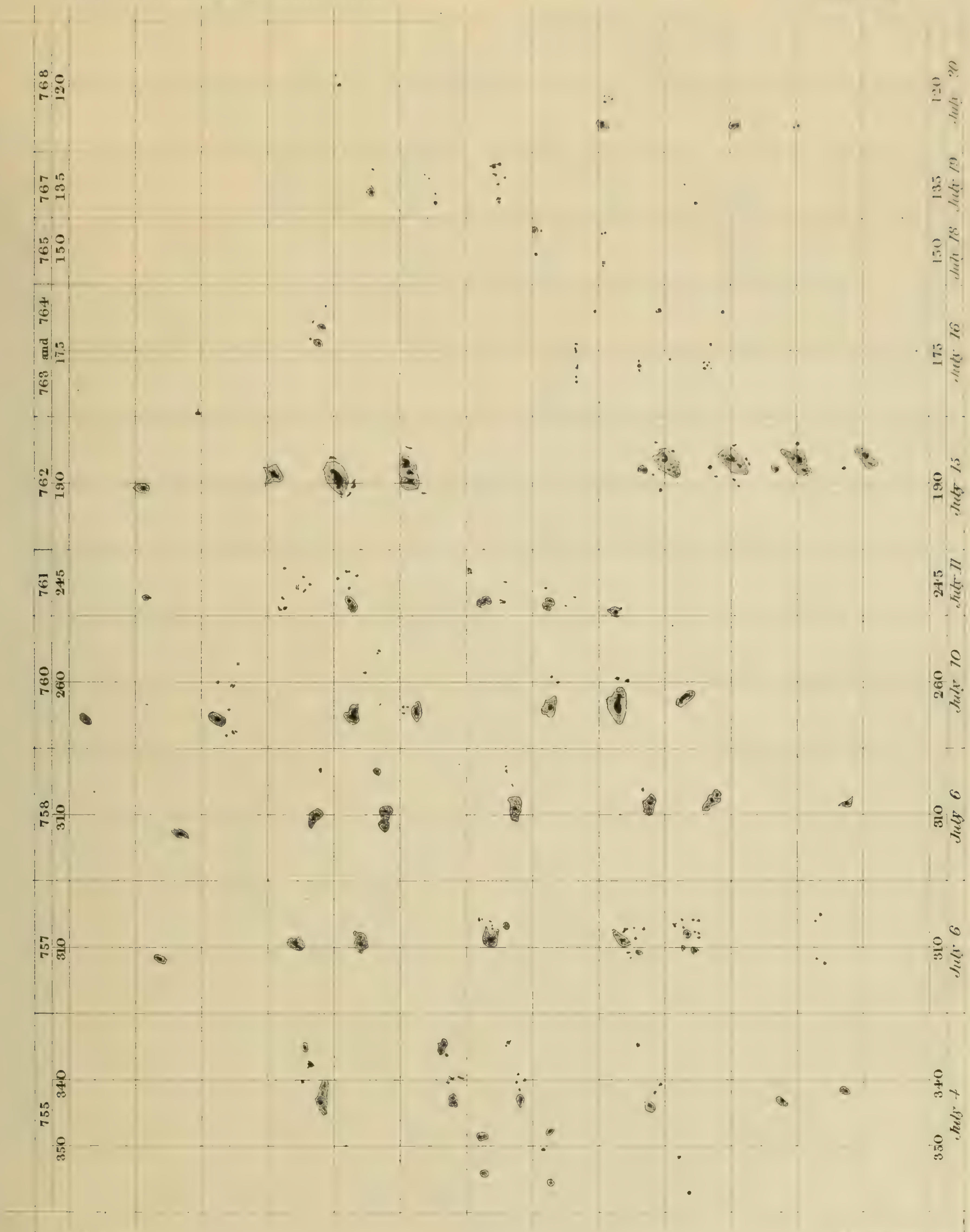
OBS. OF SOLAR SPOTS BY R C. CARRINGTON

PLATE 148.

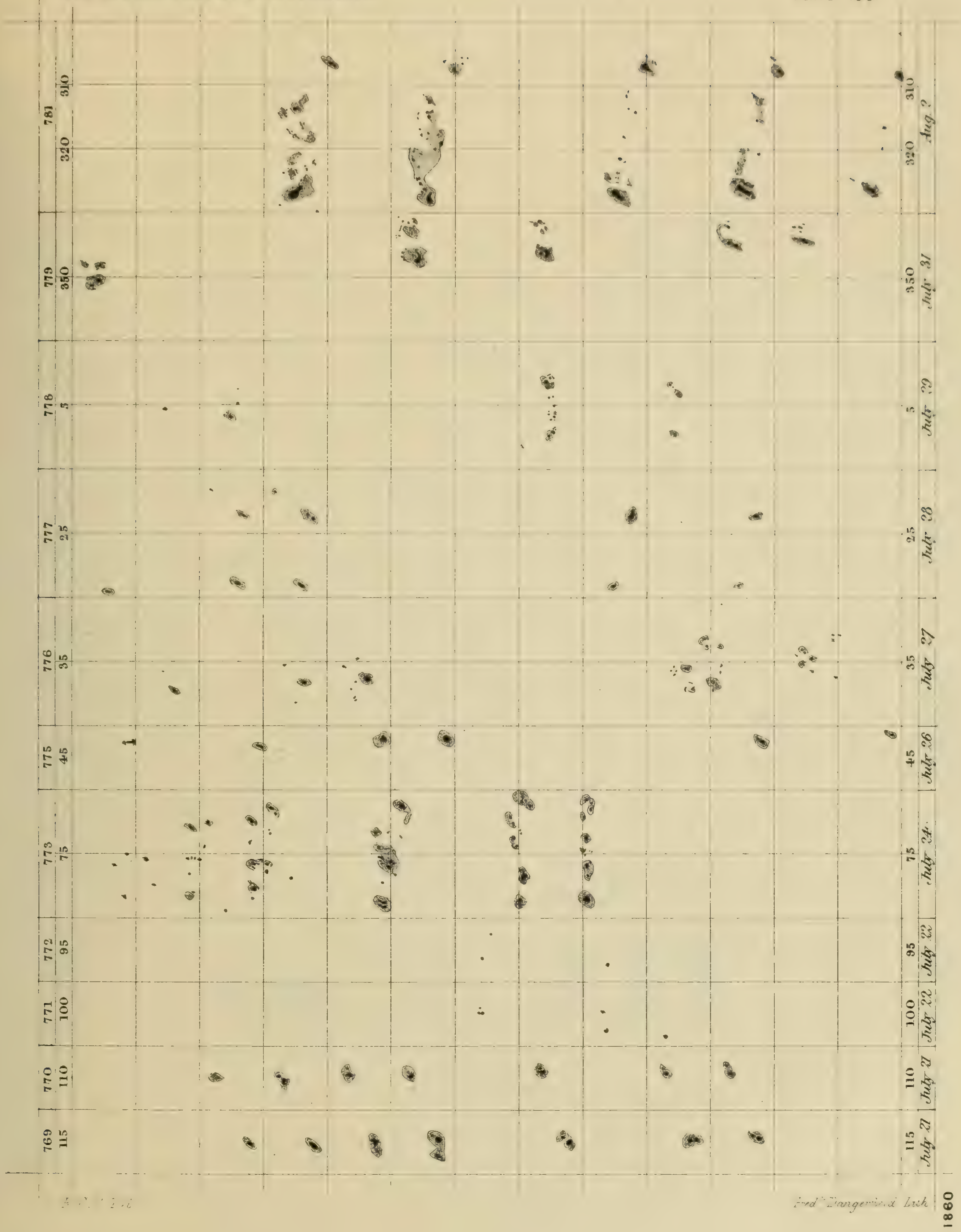


Fred^k Dangerfield

1860.


768 120
767 135
765 150
763 and 764 175
762 190
761 245
760 260
758 310
757 310
755 340 350
120 July 20
135 July 19
150 July 18
175 July 16
190 July 15
245 July 11
260 July 10
310 July 6
310 July 6
340 350 July 4

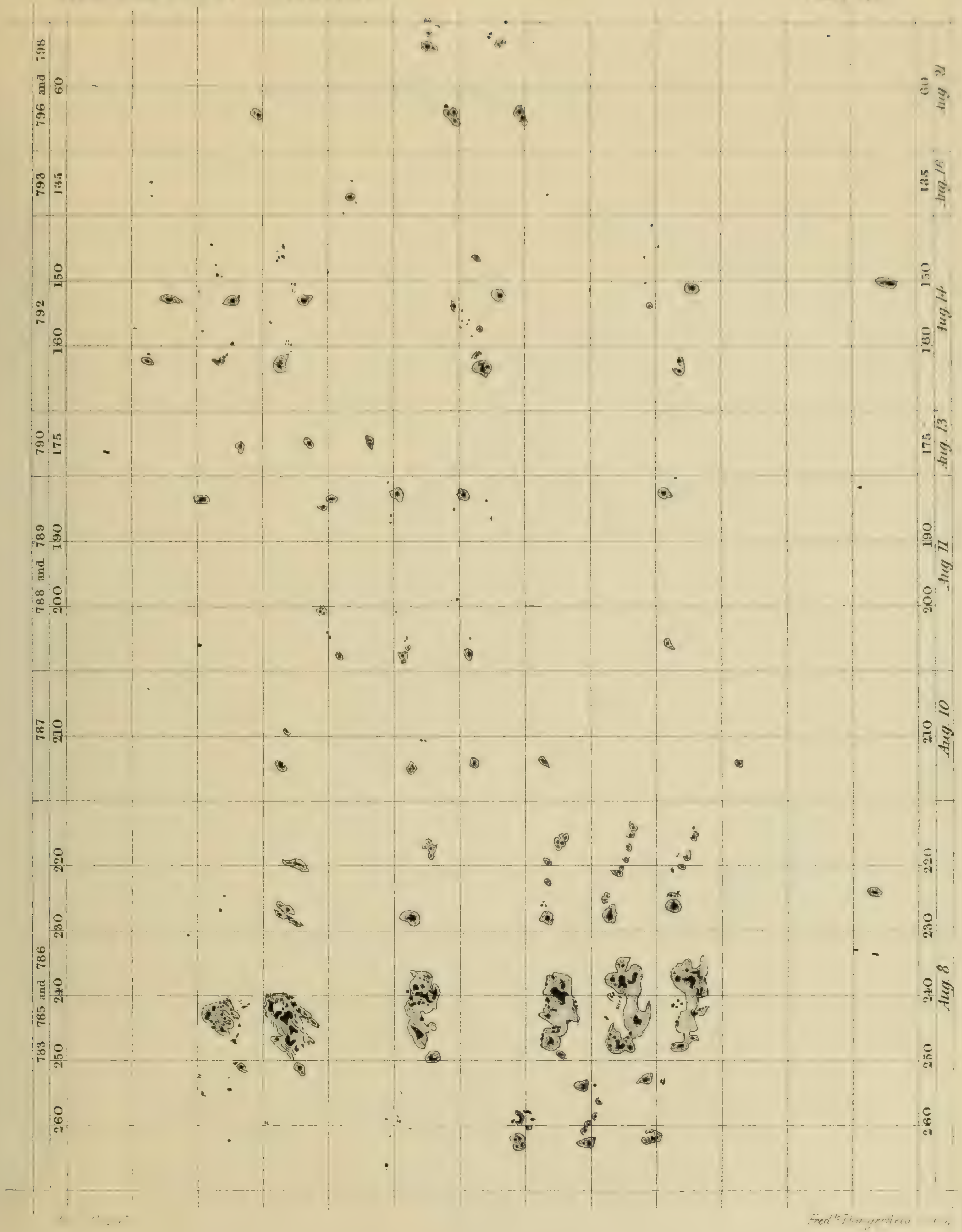
1860.



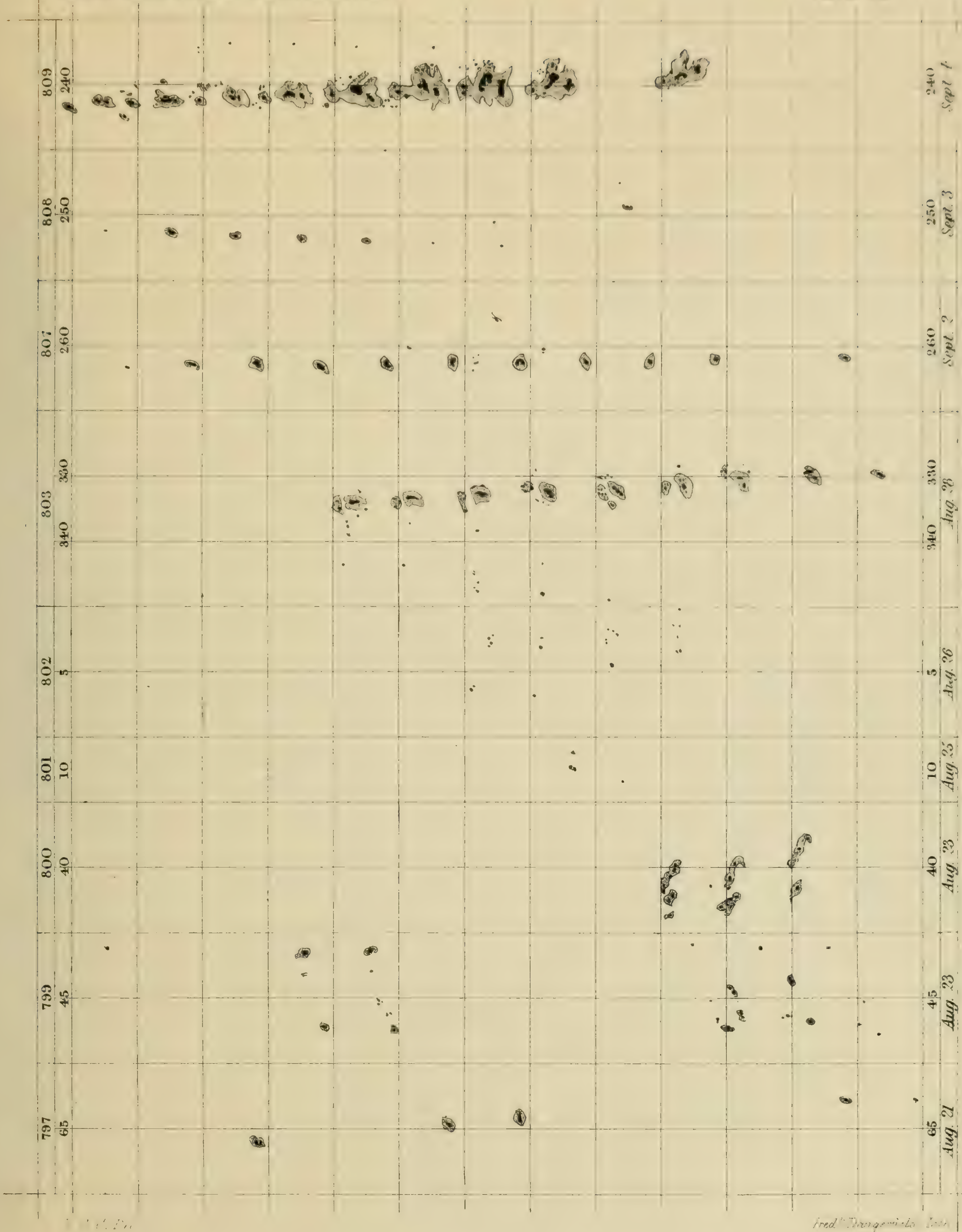
769 115
770 110
771 100
772 95
773 75
775 45
776 35
777 25
778 5
779 350
781 320 310
July 21
July 21
July 22
July 22
July 24
July 26
July 27
July 28
July 29
July 31
Aug 2
Fredk Dangerfield Lith
1860

Obs. of Solar Spots by R C Carrington

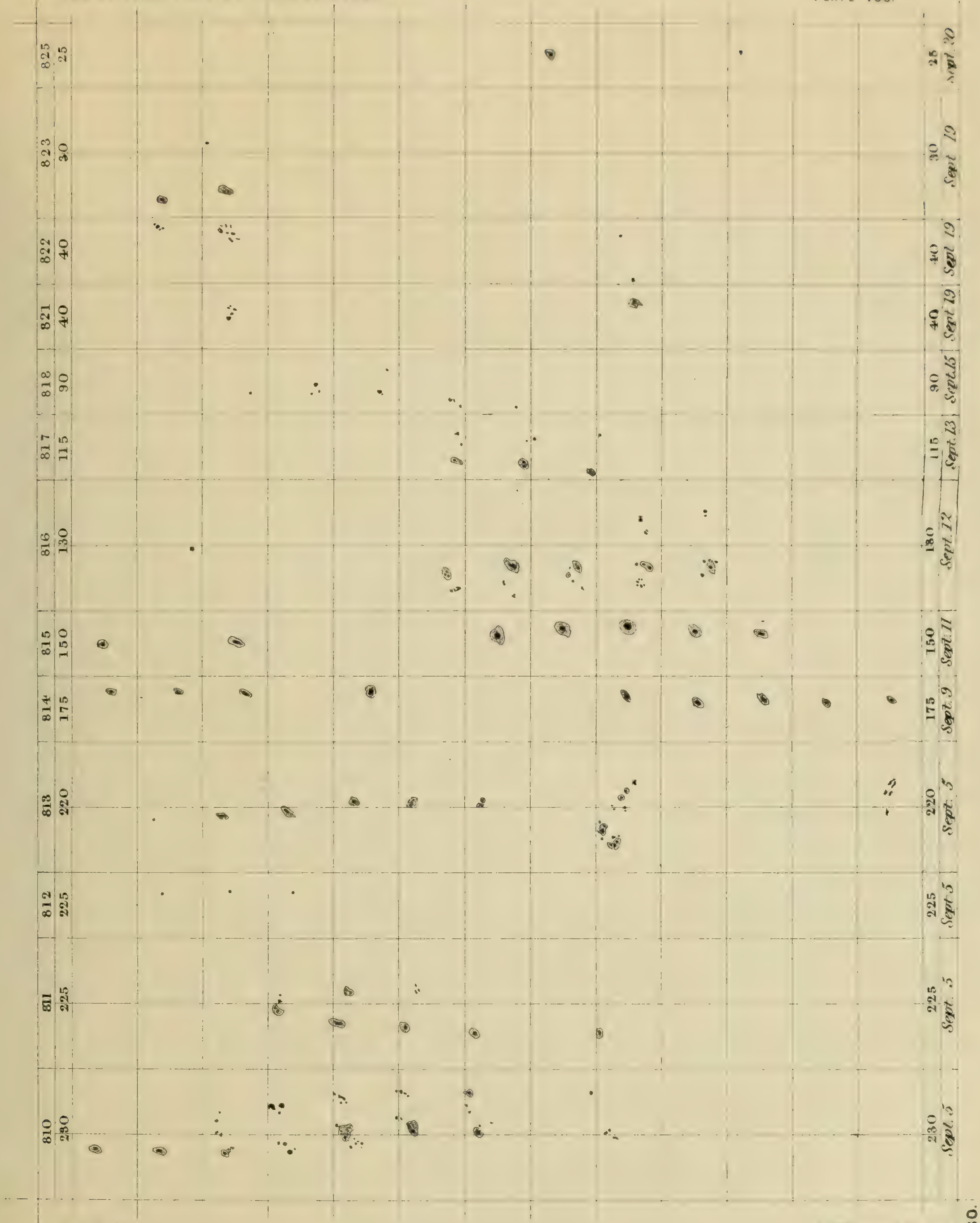
Plate 151.



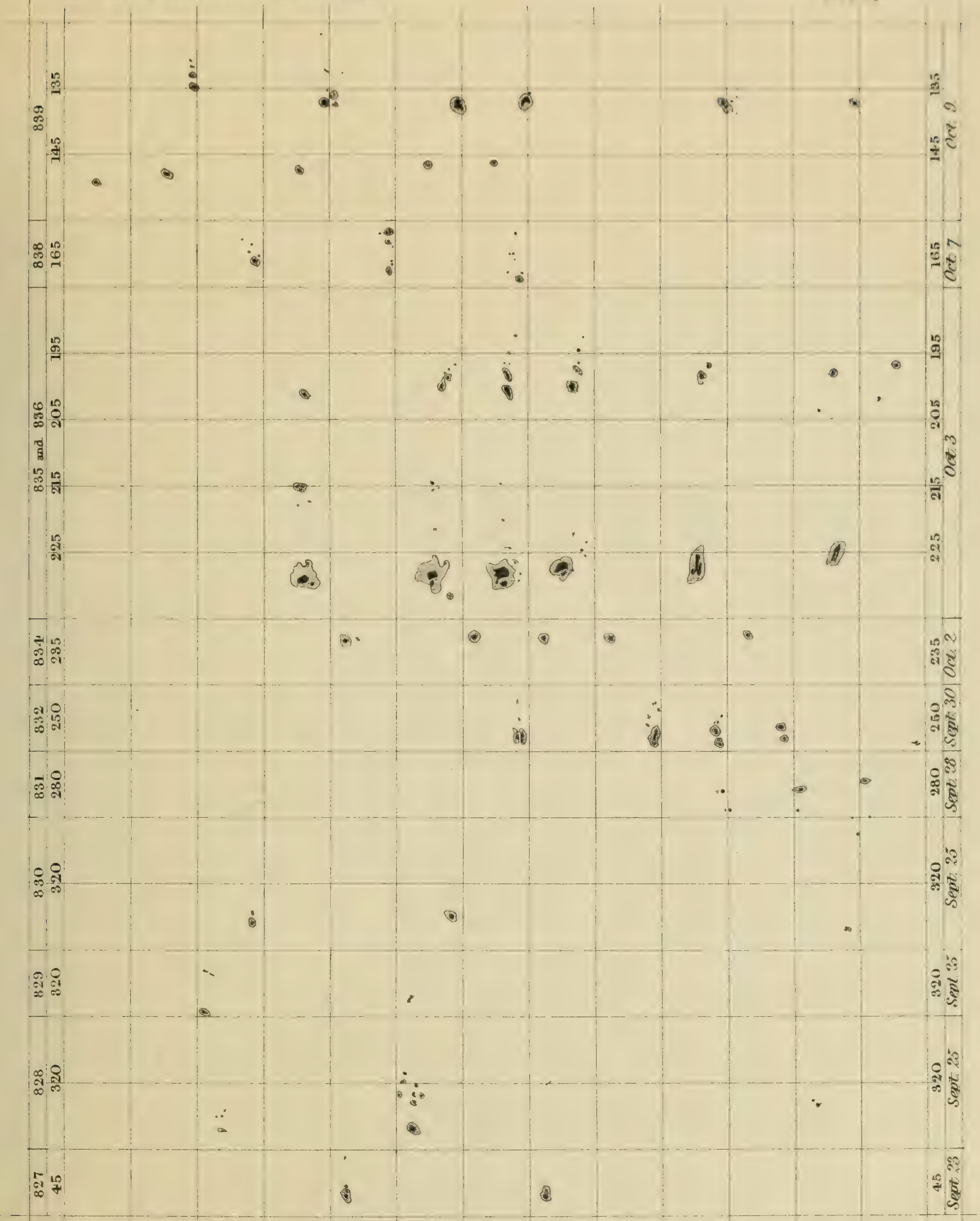
1860


809
240
808
250
807
260
803
330
340
802
5
801
10
800
40
799
45
797
65
Sept. 4
Sept. 3
Sept. 2
Aug. 28
Aug. 26
Aug. 25
Aug. 23
Aug. 23
Aug. 21

1860


825 25
823 30
822 40
821 40
818 90
817 115
816 130
815 150
814 175
813 220
812 225
811 225
810 230
25 Sept 20
30 Sept 19
40 Sept 19
40 Sept 19
90 Sept 15
115 Sept 13
130 Sept 12
150 Sept 11
175 Sept 9
220 Sept 5
225 Sept 5
225 Sept 5
230 Sept 5

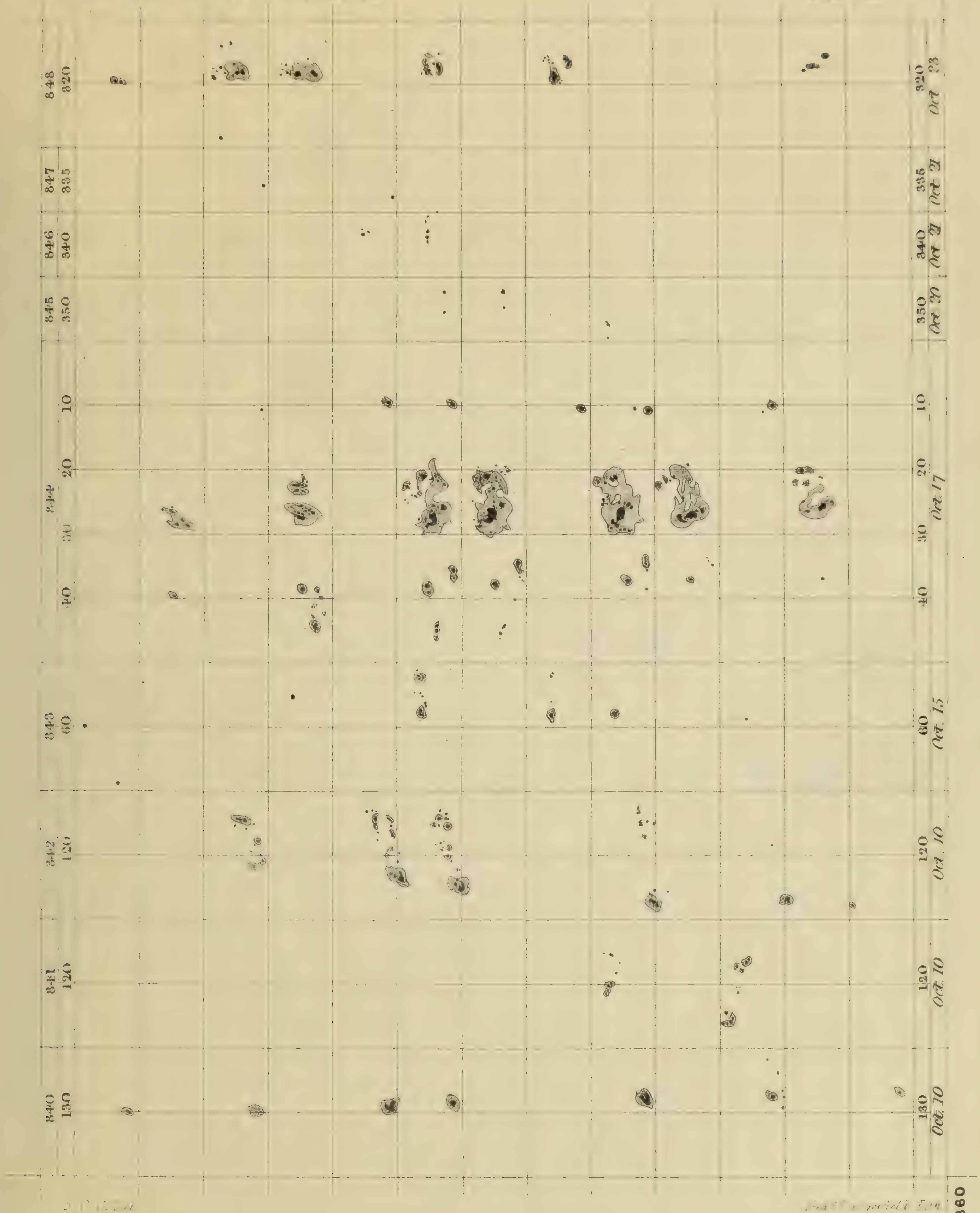
1860.

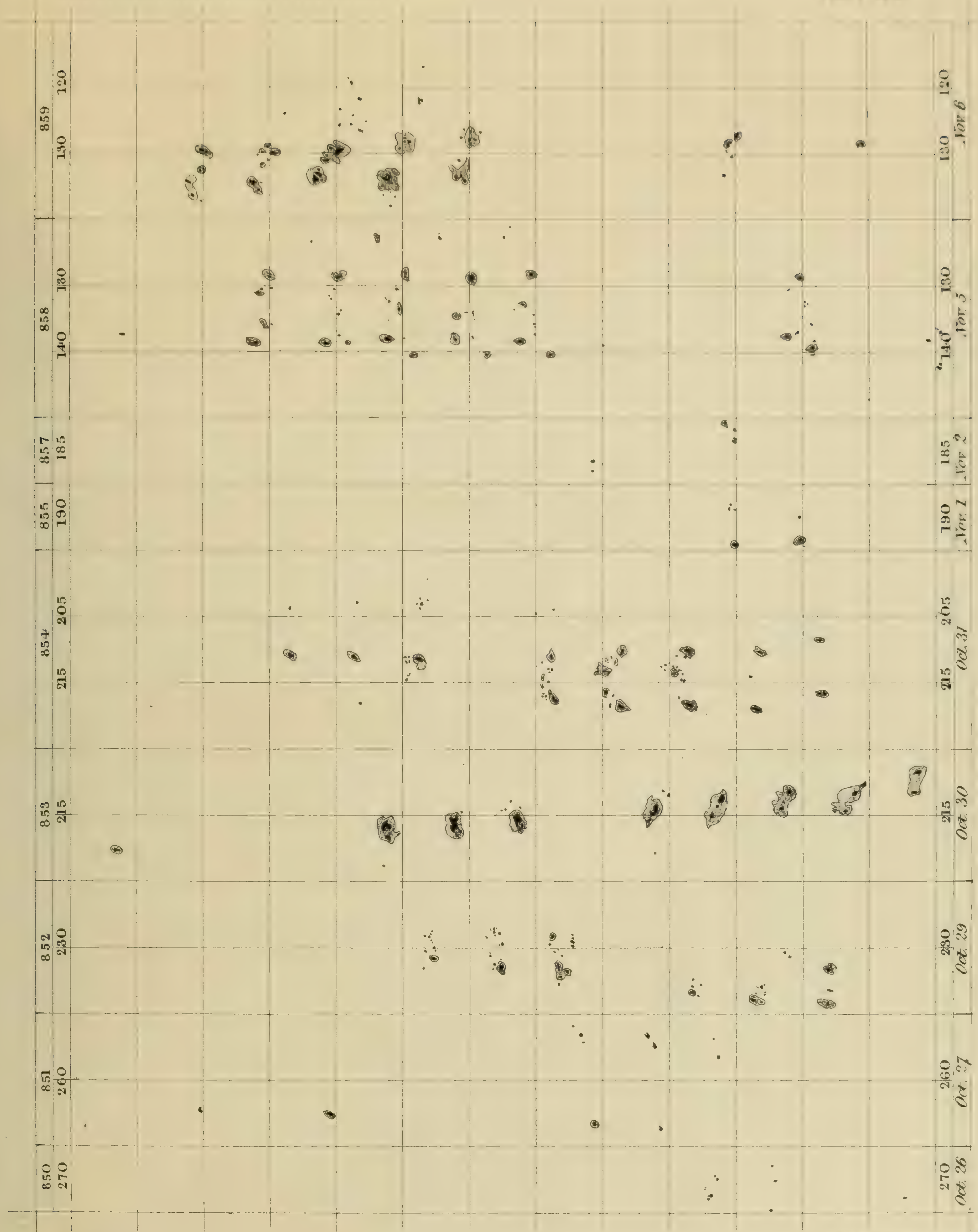


R. C. C. Del

Fred^k Dangerfield Lith

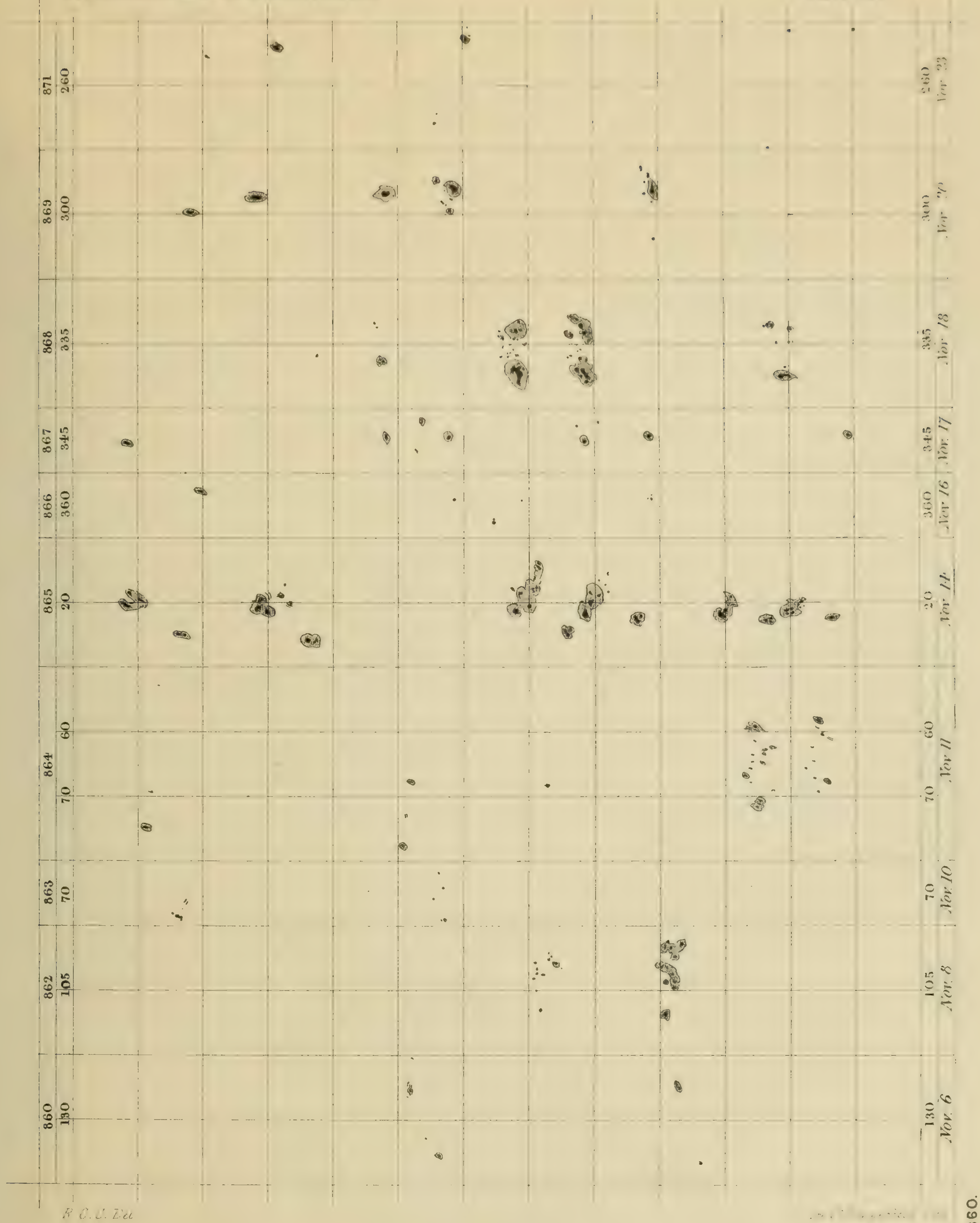
1860


848 320
847 335
846 340
845 350
10
20
844
30
40
843 60
842 120
841 120
840 130
320 Oct 23
335 Oct 21
340 Oct 21
350 Oct 20
10
20 Oct 17
30
40
60 Oct 15
120 Oct 10
120 Oct 10
130 Oct 10
1860

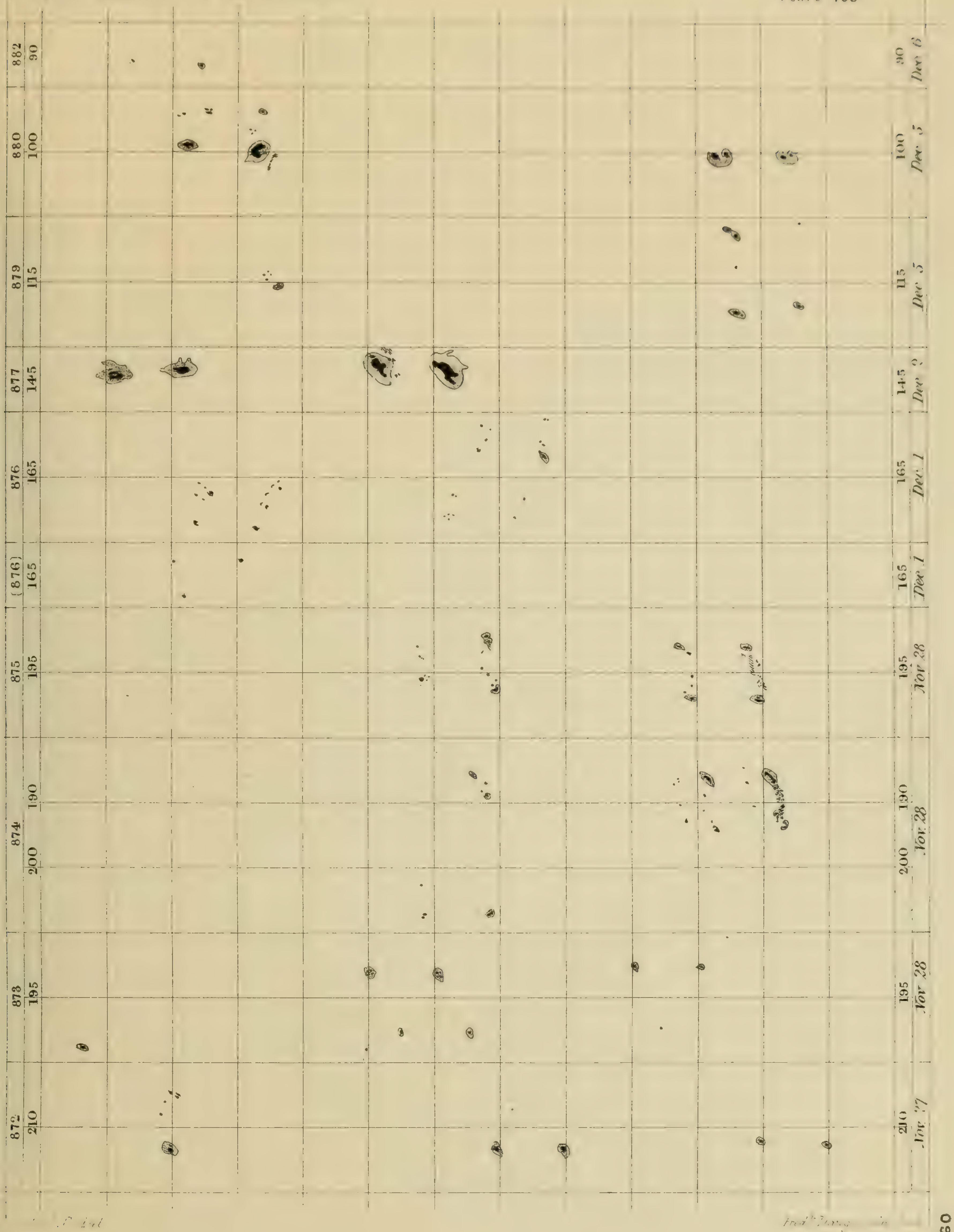

859
120
130
858
130
140
857
185
855
190
854
205
215
853
215
852
230
851
260
850
270
Nov. 6
Nov. 5
Nov. 2
Nov. 1
Oct. 31
Oct. 30
Oct. 29
Oct. 27
Oct. 26

R. C. C. Del.

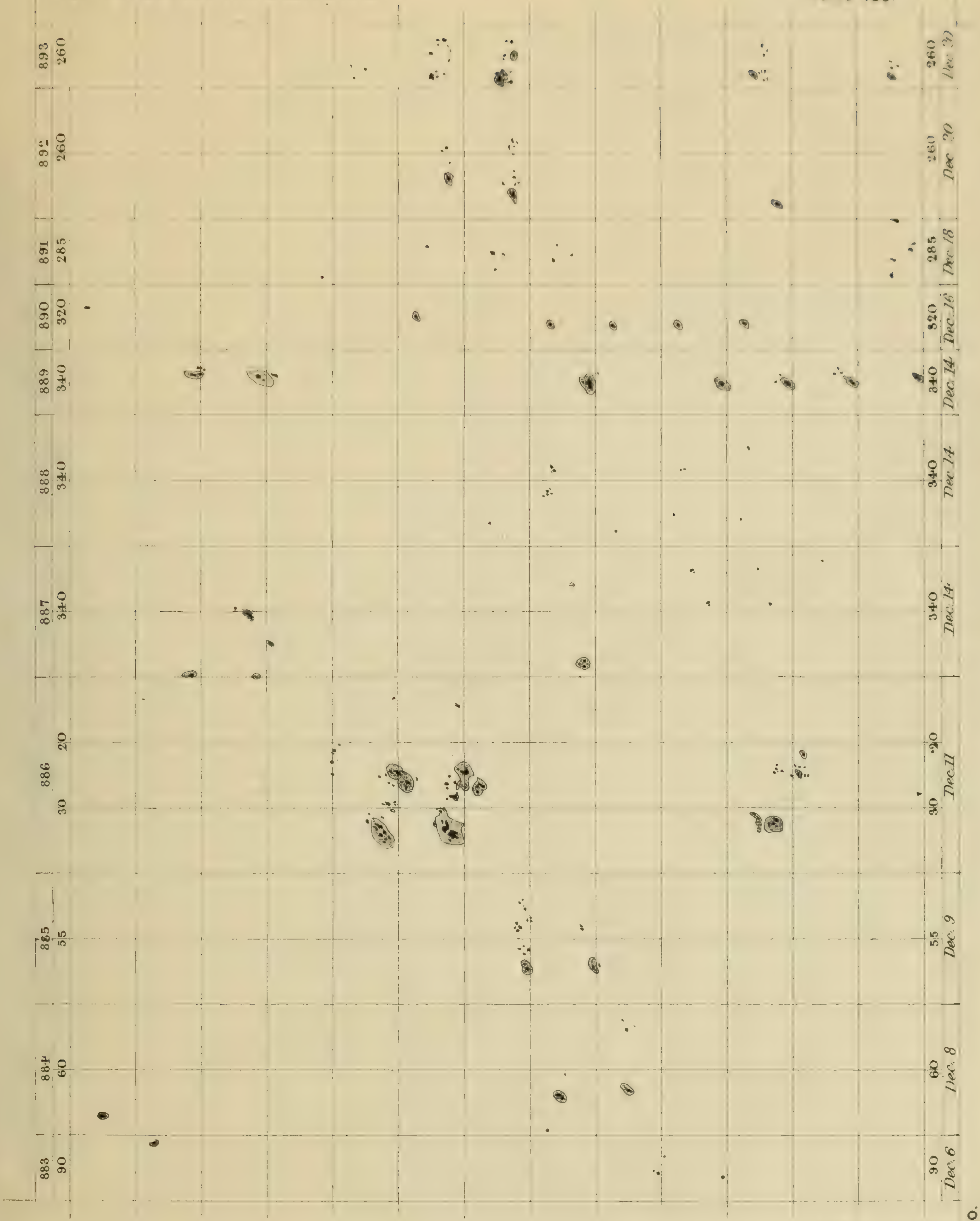
1860.


871 260
869 300
868 335
867 345
866 360
865 20
60
864
70
863 70
862 105
860 130
260 Nov 23
300 Nov 22
335 Nov 18
345 Nov 17
360 Nov 16
20 Nov 14
60 Nov 11 70
70 Nov 10
105 Nov 8
130 Nov 6

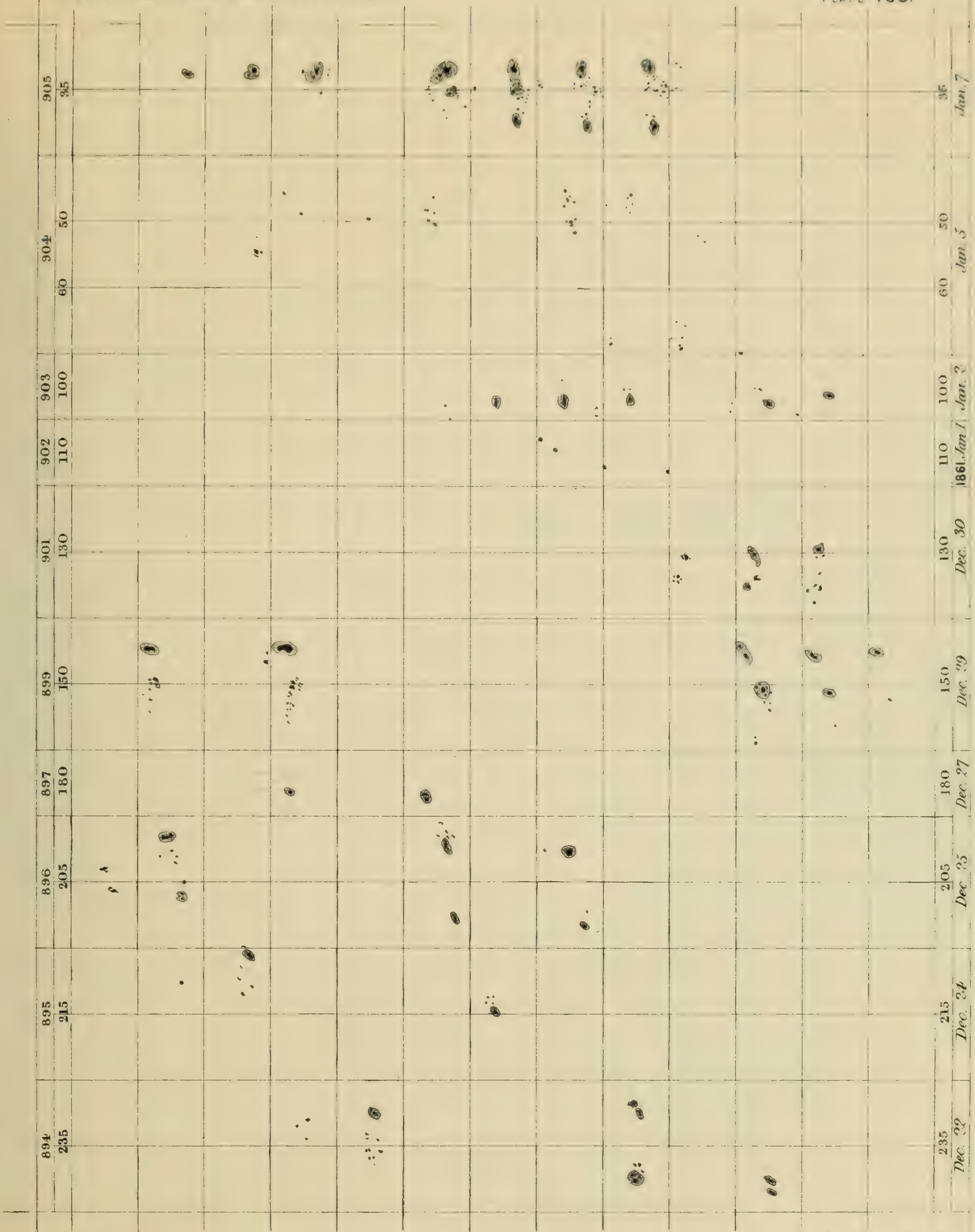
1860.


882
90
880
100
879
115
877
145
876
165
(876)
165
875
195
874
190
200
873
195
872
210

1860

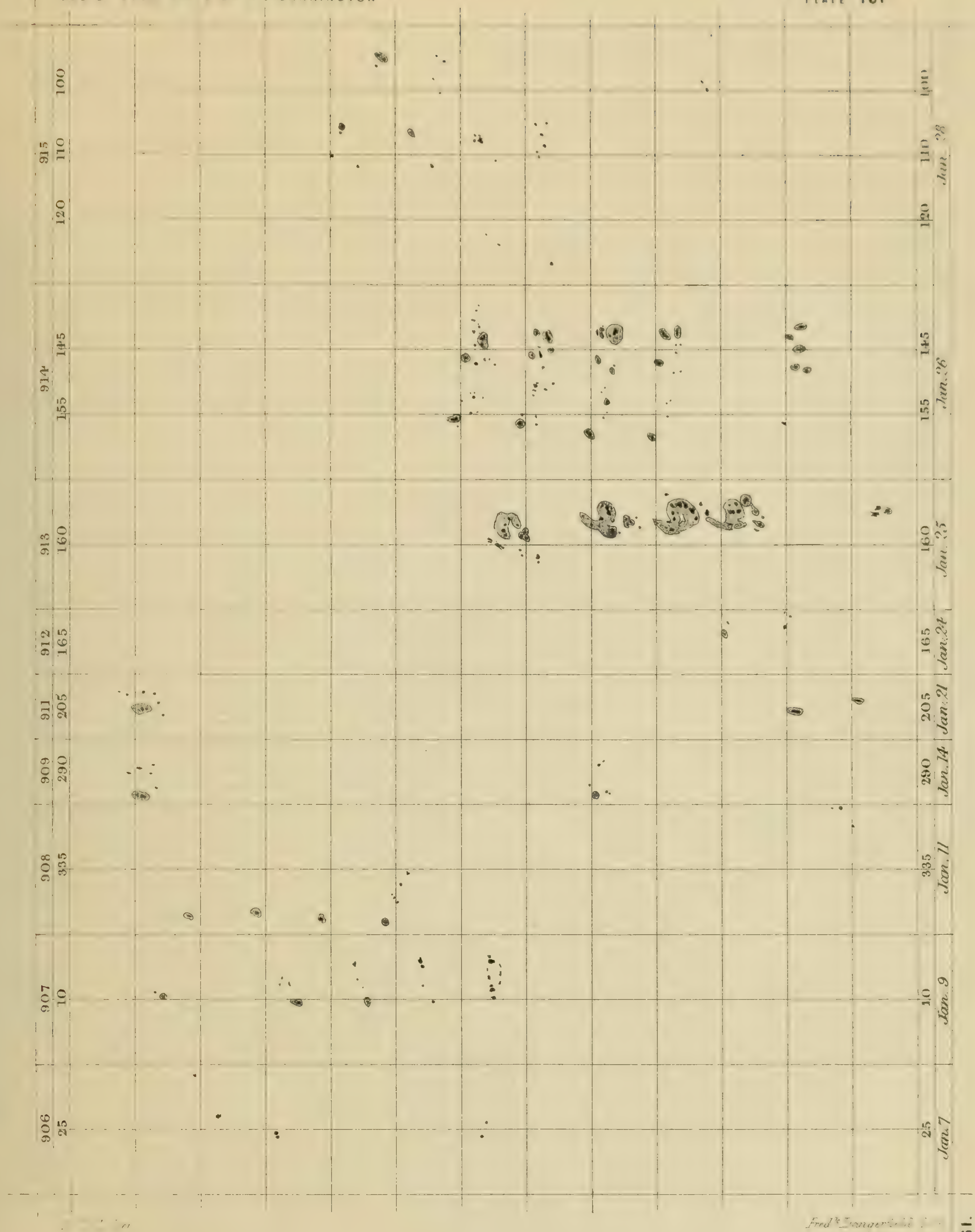

883
90
Dec. 6
884
60
Dec. 8
885
55
Dec. 9
886
30
20
Dec. 11
887
340
Dec. 14
888
340
Dec. 14
889
340
Dec. 14
890
320
Dec. 16
891
285
Dec. 18
892
260
Dec. 20
893
260

1860.

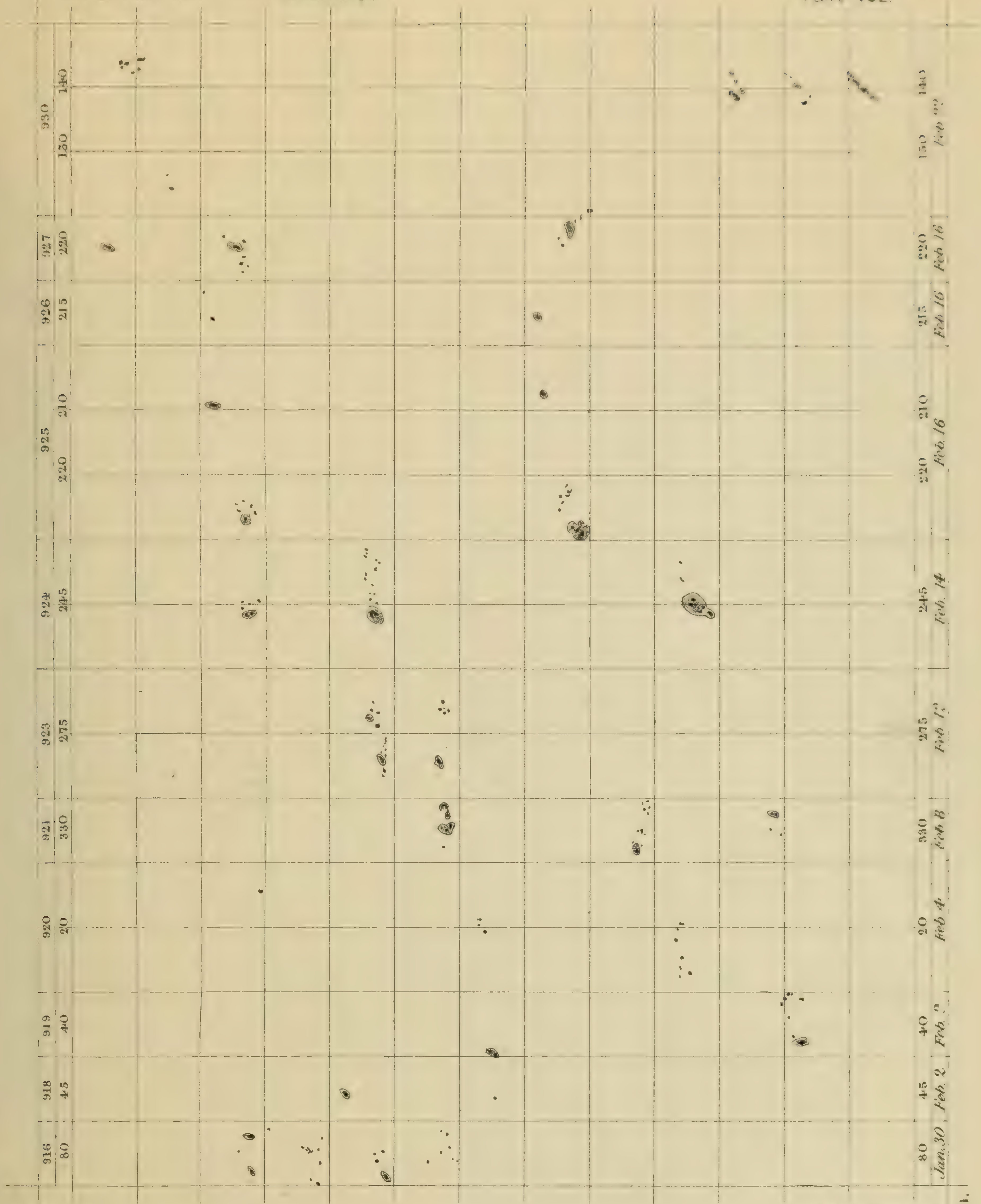

905 35
904 50
60
903 100
902 110
901 130
899 150
897 180
896 205
895 215
894 235
35 Jan. 7
50 Jan. 5
60
100 Jan. 2
110 1861 Jan. 1
130 Dec. 30
150 Dec. 29
180 Dec. 27
205 Dec. 25
215 Dec. 24
235 Dec. 22

R. C. C. Del.

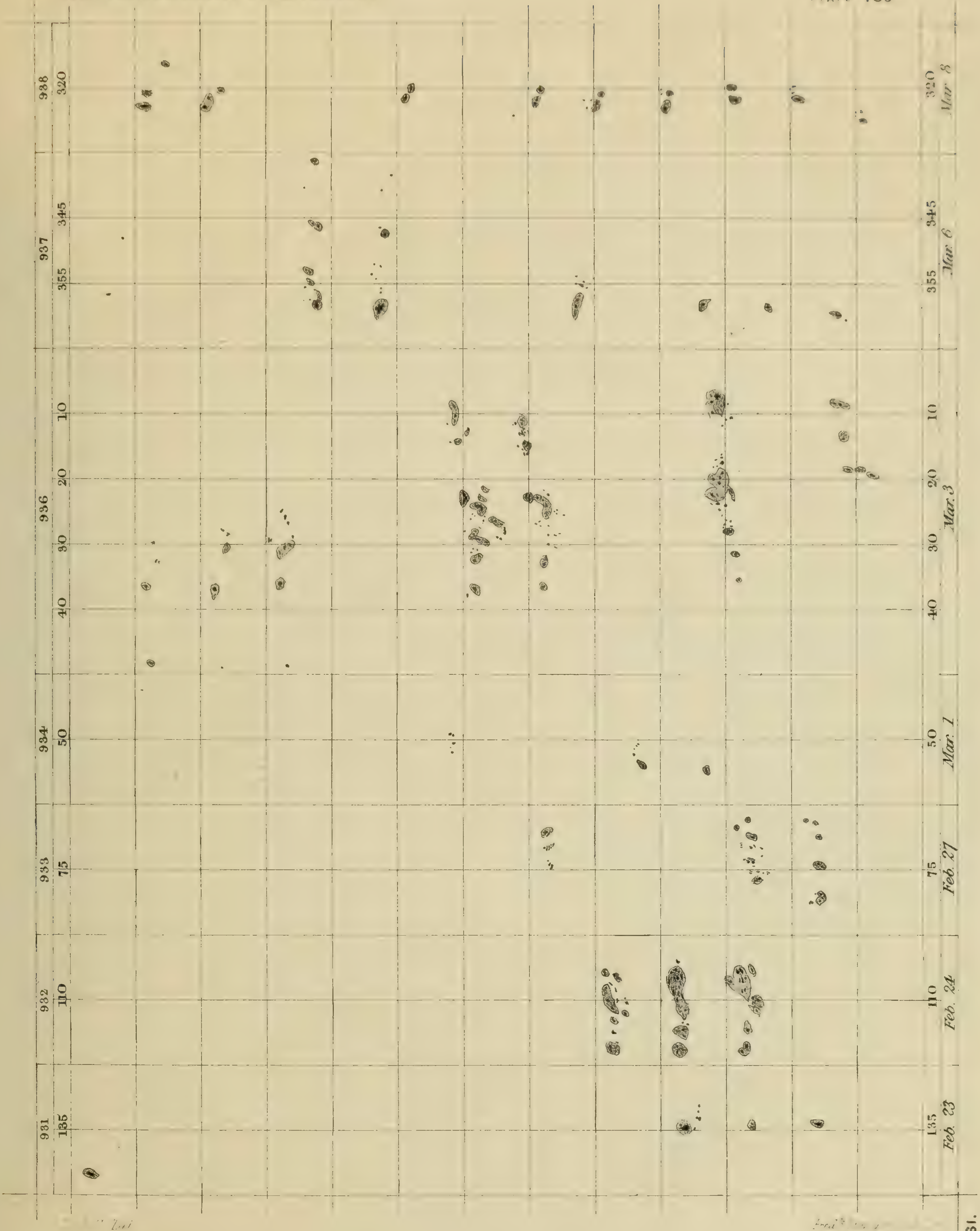
1860.


906 25
907 10
908 335
909 290
911 205
912 165
913 160
914 145 155
915 110
100
120
Jan. 7
Jan. 9
Jan. 11
Jan. 14
Jan. 21
Jan. 24
Jan. 25
Jan. 26
Jan. 28

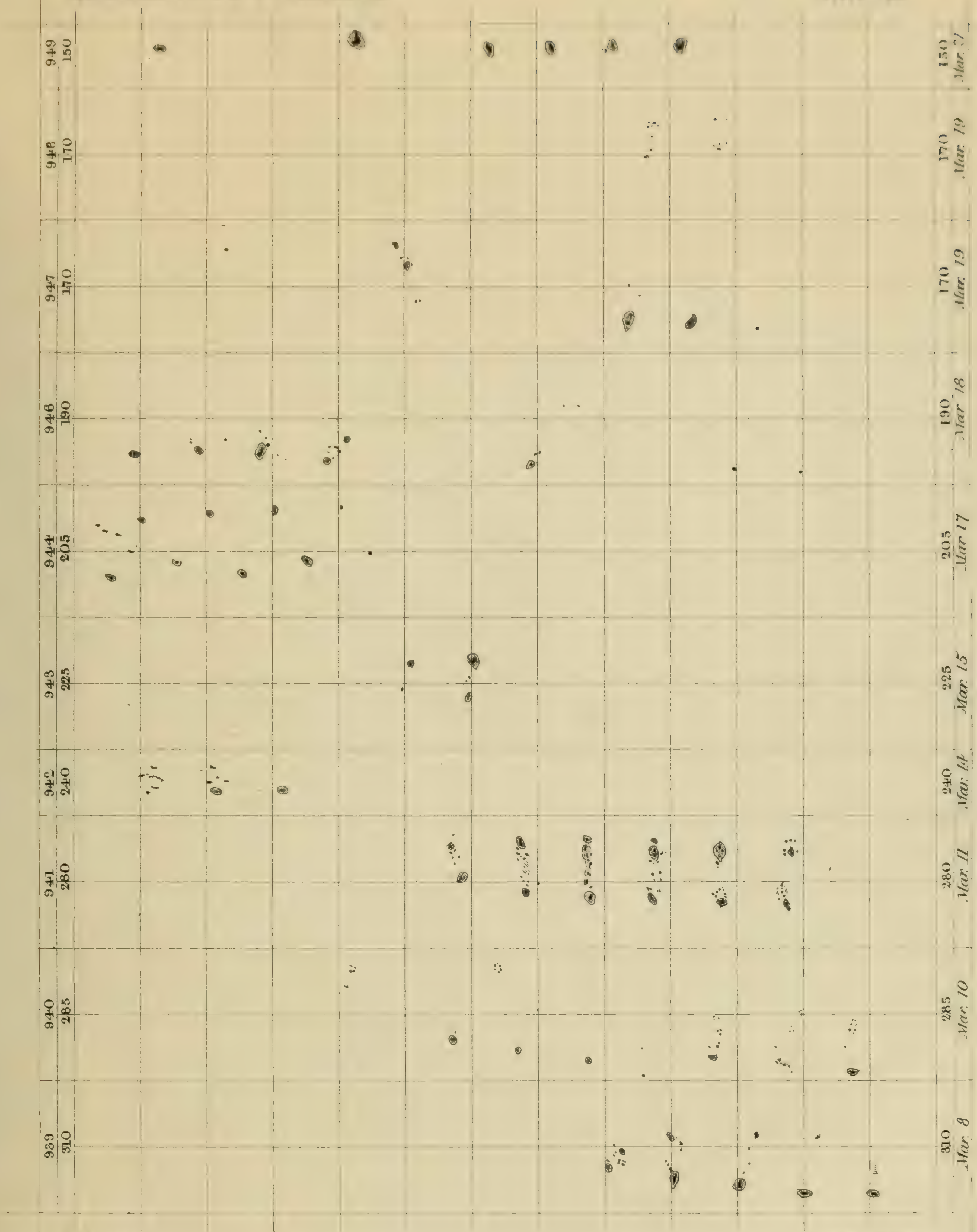
1861.


930
140
150
927
220
926
215
925
210
220
924
245
923
275
921
330
920
20
919
40
918
45
916
80
Feb. 16
Feb. 16
Feb. 16
Feb. 14
Feb. 8
Feb. 4
Feb. 2
Jan.30

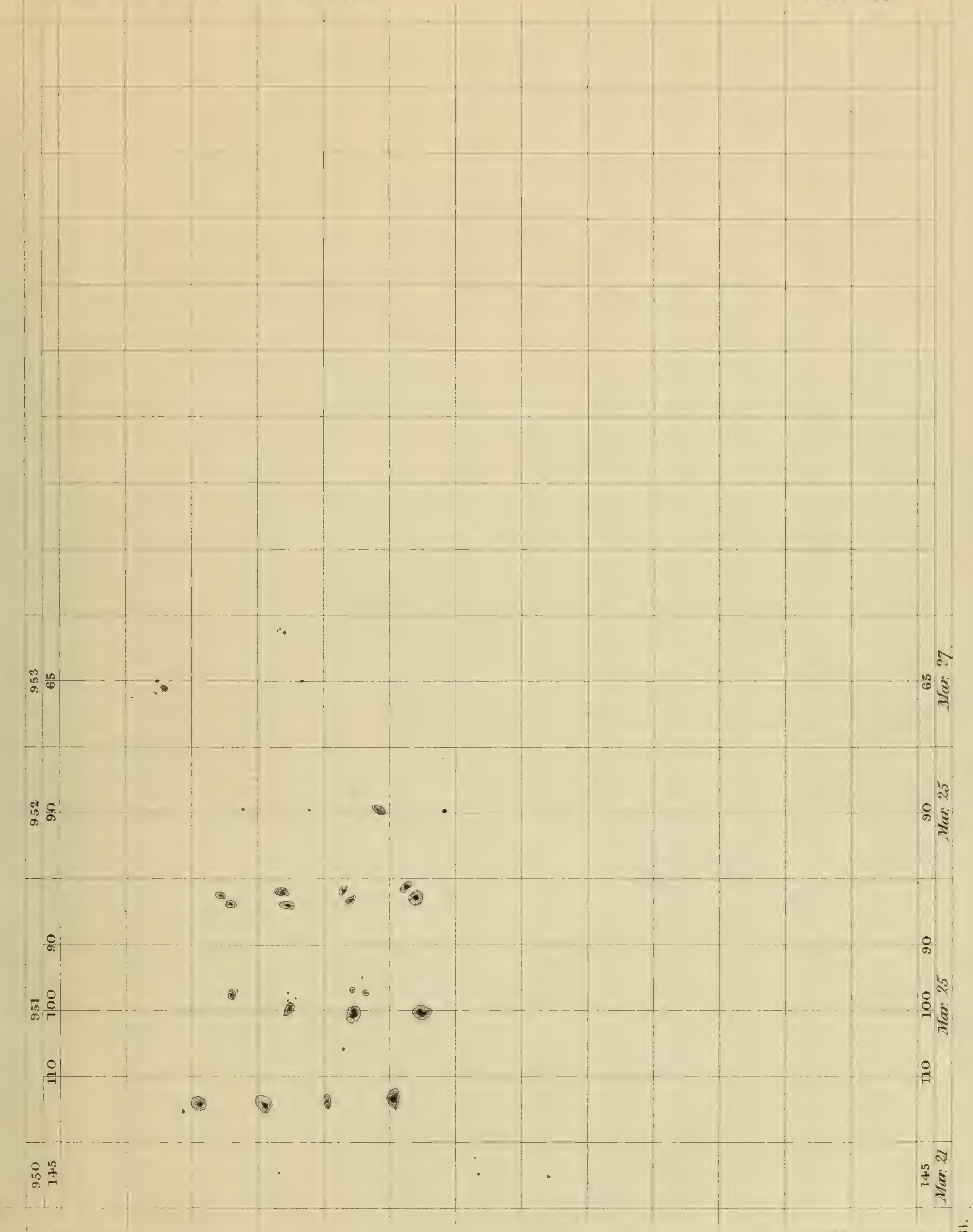
1861.


938
937
936
934
933
932
931
320
345
355
10
20
30
40
50
75
110
135
Mar 8
Mar 6
Mar 3
Mar 1
Feb 27
Feb 24
Feb 23

1861.

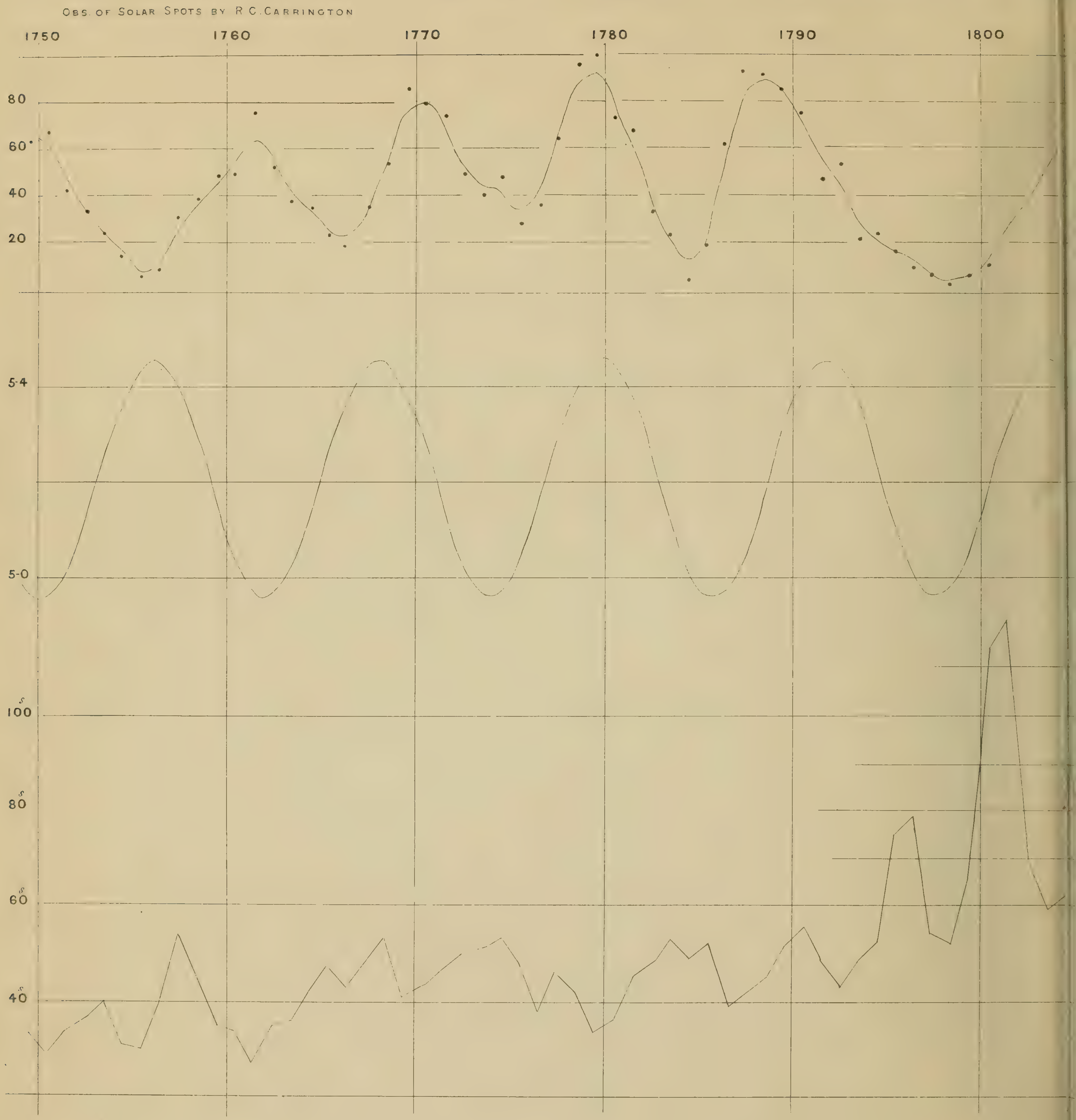

949 150
948 170
947 170
946 190
944 205
943 225
942 240
941 260
940 285
939 310
150 Mar. 21
170 Mar. 19
170 Mar. 19
190 Mar. 18
205 Mar. 17
225 Mar. 15
240 Mar. 14
260 Mar. 11
285 Mar. 10
310 Mar. 8

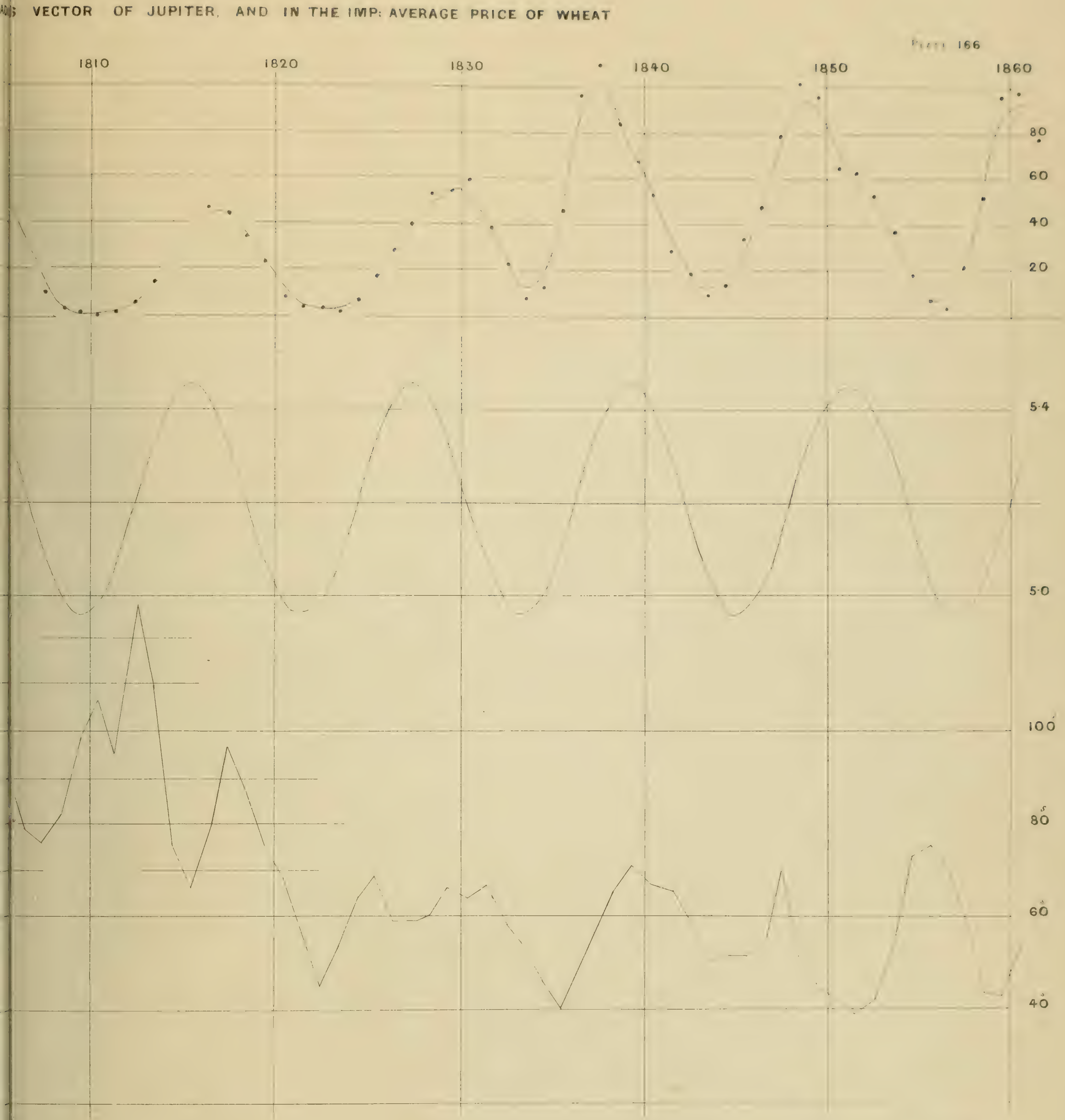
1861.



1861.

VARIATIONS IN FREQUENCY OF THE SOLAR SPOTS, IN THE RAD[US]




VECTOR OF JUPITER, AND IN THE IMP: AVERAGE PRICE OF WHEAT
166
1810
1820
1830
1840
1850
1860
80
60
40
20
5·4
5·0
100
80
60
40